BIOLOGICAL EVALUATION OF GYPSY MOTH INFESTATIONS

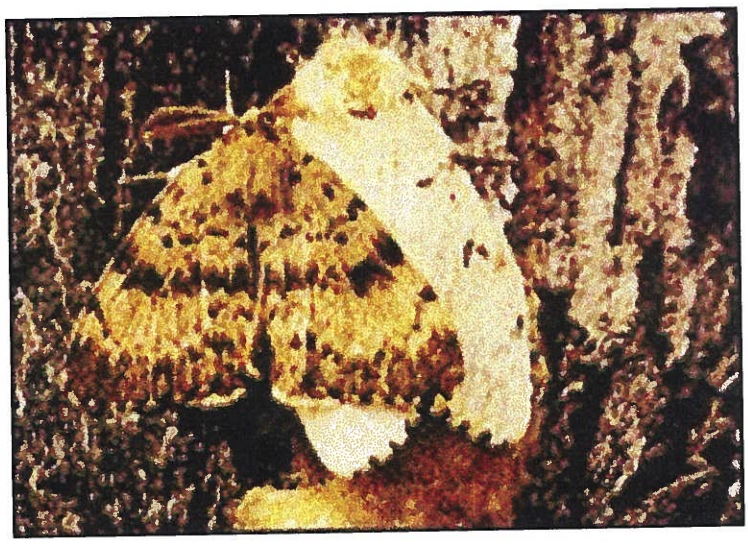
and

PRE-SUPPRESSION ASSESSMENT OF PROPOSED SPRAY BLOCKS

on the

MONONGAHELA NATIONAL FOREST, WEST VIRGINIA

2001



Robert Acciavatti, Forest Entomologist,
Forest Health Protection

and

Ann Steketee, GIS Specialist,
Information Management and Analysis

USDA, Forest Service
State and Private Forestry
180 Canfield Street
Morgantown, WV 26505

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SUMMARY

The gypsy moth, *Lymantria dispar* (Linneaus), infestations first caused major defoliation on the Monongahela National Forest (MNF), West Virginia, in the early 1990s. Following the collapse of these infestations in 1995, this major pest of oak forests remained at low population densities until outbreak densities reappeared in 2000. That year and again in 2001, this species caused unacceptable levels of defoliation each year on nearly 50,000 acres, primarily in the eastern and southern portions of the MNF.

This report presents a biological evaluation of the current gypsy moth situation on the MNF and reintroduces the gypsy moth integrated pest management (GMIPM) strategy to guide gypsy moth management on the MNF in FY 2002. The strategy for managing gypsy moth infestations on the MNF under a GMIPM approach had been developed jointly by the MNF and FHP staffs and implemented in 1992 when outbreaks of this major forest pest first appeared on the MNF.

The biological evaluation of current gypsy moth infestation on the MNF was based on egg mass surveys conducted during September and October 2001. Surveys established the current population densities that were used to predict 2002 defoliation in 35 Survey Units containing forest stands of susceptible oak type. There were 13 units on the Cheat/ Potomac RD, 4 units on the Greenbrier RD and 18 units on the Marlinton/White Sulphur RD. Survey results provide the data for predicting where gypsy moth infestations in 2002 would result in defoliation exceeding damage thresholds for larval nuisance and associated light to moderate defoliation, and the permanent damage of moderate to severe defoliation leading to tree decline, dieback and mortality.

Fourteen proposed spray blocks within these Survey Units, totaling 13,206 acres and encompassing these gypsy moth infestations, were jointly identified by the MNF and FHP as candidates for spraying in 2002. Forest resources impacts were assessed in terms of the MNF's traditional resources values of timber, wildlife and recreation, and non-traditional resources values of sustaining ecosystem health, biodiversity and T&ES species. However, assessment of gypsy moth defoliation trends in these 14 led to the consideration of only 13 proposed spray blocks totaling 13,122 acres for treatment in 2002. Defoliation was predicted to exceed 50% in 11 of those spray blocks chosen. Slightly lower defoliation was predicted in two spray blocks also sprayed in 2001.

Criteria for establishing treatment alternatives were developed through NEPA scooping during previous suppression projects. The no action alternative would rely on the largely unpredictable, but at times effective, natural control of gypsy moth populations exerted by the gypsy moth specific larval pathogens, NPV and fungus. Proposed aerial spraying of biological insecticides, when gypsy moth larvae are most vulnerable and defoliation is minimal, more predictably prevents unacceptable damage to forest resources than relying on natural controls.

It is recommended the MNF give serious consideration to the spray treatment alternative.

INTRODUCTION AND BACKGROUND

The gypsy moth, *Lymantria dispar* (Linneaus), infestations first caused major defoliation on the Monongahela National Forest (MNF) in West Virginia in the early 1990s. Following the collapse of these infestations in 1995 from the gypsy moth fungus, this forest pest remained at low population densities until outbreak densities reappeared in 2000.

During May and June of 2000, a forested area of nearly 42,420 acres within the proclamation boundary of the Monongahela National Forest (MNF) were defoliated by larvae of the gypsy moth, *Lymantria dispar* (Linneaus). Of this acreage, 12,246 acres were moderately to heavily defoliated (> 50 % foliage removed) and 8,363 acres were lightly to moderately defoliated (< 50 % foliage removed).

Areas of the MNF totaling 14,381 acres were aerially sprayed in May 2001 with *Bacillus thuringiensis* var. *kurstaki* (Btk). The objective of the treatment was to prevent additional unacceptable damage to forest resources from concentrated high-density gypsy moth populations within areas defoliated in 2000.

Outside the acreage sprayed in 2001, gypsy moth defoliation within the proclamation boundary increased slightly to about 49,803 acres. Nearly all of this forested area (45,526 acres) was heavily defoliated; a much smaller amount (4,277 acres) was moderately defoliated.

Treatments are done for the following reasons: 1) to prevent nuisance and aesthetic loss in developed recreation areas; 2) to reduce tree mortality and maintain wildlife habitat where management goals are timber and wildlife oriented; 3) to enhance visual quality for dispersed recreation; and, 4) to promote biodiversity through protecting forest health and habitat for non-target species of special concern, and for threatened and endangered species.

There have been no forest damage surveys to quantify tree mortality resulting from the gypsy moth infestation on the MNF in the early 1990's. However, in similar susceptible oak forests in Pennsylvania, Maryland, Virginia, and the eastern panhandle of West Virginia, gypsy moth infestations have caused substantial oak mortality in some stands of up to 80% loss of stand basal area stocking.

Impacts on timber production and the permanent alteration of tree mortality on forest stand structure for wildlife habitat and biodiversity were documented by research and management in these states. The adverse impacts of larval nuisance, defoliation, and tree mortality on people and trees at developed recreation sites also have been documented.

OBJECTIVES

The objectives of this biological evaluation within the context of GMIPM were to: 1) generally estimate gypsy moth population densities within specific Survey Units containing forest stands of susceptible oak on the MNF for three RDs --Cheat/ Potomac RD, the Greenbrier RD and the Marlinton/White Sulphur RD; 2) reasonably predict the defoliation expected for these Survey Units in 2002 to determine how the damage caused by those populations would impact forest resources during the next growing season; and, 3) select proposed spray blocks based on defoliation trends and their likely impacts; 4) develop environmentally responsible and economically feasible treatment alternatives to suppress those populations posing the greatest risk to national forest resource values and uses while sustaining habitat and species diversity.

GYPSY MOTH INTEGRATED PEST MANAGEMENT (GMIPM)

The following approach to GMIPM is a slightly modified version of that developed for the MNF in FY 1993 by Robert Acciavatti, FHP-Morgantown, and presented at the Potomac RD on Wednesday, November 18, 1992. The earlier approach is based on the white paper entitled "Post AIPM Gypsy Moth Management within the Proclamation Boundary of the Monongahela National Forest", jointly agreed to by R-9, MNF and NA, FHP on September 28, 1992, at the MNF SO, Elkins, WV. Presentation of GMIPM in this report is necessary for documenting this approach as additional Ranger Districts and new personnel in the SO and all RDs become involved with management decisions to deal with gypsy moth infestations now and in the future.

GMIPM Strategy and Procedures in 2001

1. Aerial sketchmapping surveys by USDA Forest Service, Forest Health Protection Staff, and the West Virginia Department of Agriculture, locate and map gypsy moth populations at outbreak densities that had defoliated forested areas of the MNF.

In 2001, portions of three MNF RDs were considered for GMIPM as follows:

- Cheat/ Potomac RD – Big Mt., Cave Mt., Fore Knobs of Allegheny Front, Middle Mt., Peters Mt., Pretty Ridge, Seneca Rocks, Tract Hill descriptive location and GPS coordinates of plot.
- Greenbrier RD – Chestnut Ridge, Lee Bell, Sugar Camp.
- Marlinton/White Sulphur RD – Allegheny Mt.,Beaver Lick Mt.,Brushy Mt., Buckley Mt., Elk River, Grindstone Knob, High Top, Lake Sherwood, Lockridge Mt., Mad Tom Knob, Marlin Mt., Meadow Creek Mt., Michael Mt., Middle Mt., Paddy Knob, Thorny Creek.

2. Survey Units for gypsy moth egg mass surveys are delineated within those portions of the defoliated areas of the MNF with MNF Land Management Plan goals of timber (3.), wildlife habitat (6.1), dispersed recreation with salvage only (6.2), and developed recreation areas.

For 2001, there were 35 Survey Units distributed by MNF RD as follows:

- Cheat/ Potomac RD -- 13 units

- Greenbrier RD -- 4 units
- Marlinton/White Sulphur RD -- 18 units

3. In each Survey Unit, 1/40-acre survey plots are taken where oaks, the most susceptible gypsy moth host tree species, predominate. The plots are to be reasonably distributed throughout each Survey Unit with the number of plots based on available time and personnel.

During September and October 2001, FHP-Morgantown Staff, and Dave Curry, FHP contract employee, under the supervision and direction of Robert Acciavatti, established 1,061 survey plots on the MNF with the following data recorded at each plot:

- descriptive location and GPS coordinates of plot;
- number of new and old gypsy moth egg masses;
- egg mass length for new egg masses;
- presence of *Ooencyrtus* parasitic wasps on egg masses;
- dead larvae killed by virus (NPV) and *Entomophaga* fungus;
- species and diameter for trees within the plot.

Details concerning the survey are presented in the Gypsy Moth Egg Mass Survey Method and Datasheet in the Appendix.

4. FHP used the prediction model of Liebhold, *et al.* (1993) to calculate gypsy moth host type defoliation for each survey plot based on the ratio of new to old gypsy moth egg mass densities per acre and density of new eggs as a function of egg mass length.

5. Damage thresholds to be expected from the predicted defoliation indicate what forest resources values and uses (set as the highest priorities for protection in the MNF Gypsy Moth Management White Paper) would be impacted by different intensities of gypsy moth infestations.

The following chart presents the classes of gypsy moth damage based on host defoliation and damage thresholds, and indicates the MNF forest resources impacted:

Gypsy Moth Damage and Impacts Chart

Gypsy Moth Damage Class	Forest Host Type Defoliation	Gypsy Moth Population Effects and Host Type Damage Thresholds	Monongahela NF Forest Resource Values and Uses Impacted
1	No Defoliation	None	None
2	1 to 50% Defoliation	Larval nuisance to people and visual effects of light to moderate defoliation throughout the growing season	Developed Recreation T&ES; Mgt. 8: Class A visual quality of general forest; nearby private land; RNA
3	51 to100% Defoliation	Larval stripping trees causing their refoliation which increases the risk of tree decline and eventual mortality	Timber sales on high quality sites; hard mast crop; habitat biodiversity; dispersed recreation; T&ES

RNA = Research Natural Area; T&ES = Federally Threatened, Endangered, Sensitive

The damage classes are based on research results and empirical observations as to the effect gypsy moth populations at various densities have on forest trees. For example, summer refoliation of a tree occurs after spring defoliation exceeds 50 percent and leads to depletion of food reserves stored in roots. Such a tree declines in vigor and may be able to recover from one refoliation, but it is unlikely it would recover from two successive years of this damage. These trees depleted of their starch food reserves are highly vulnerable to attacks by phloem-feeding beetles, e.g. the two-lined chestnut borer, and infection by the Armillaria root rot fungus.

6. The Arc View GIS program permits the display of egg mass survey results by plot locations on large-scale sections of MNF maps. This helps visualize the location of potential damage areas.

The defoliation predicted for 2002 on each of the 1,061 egg mass survey plots is shown on the Appendix maps. These are shown in relation to the spray blocks treated in 2001 and proposed for 2002. The following color coded damage classes were used:

Green	MINIMAL
Yellow	LARVAL NUISANCE to VISIBLE DEFOLIATION
Red	TREE CROWN DECLINE, DIEBACK and MORTALITY

7. Based on the MNF Land Management Plan objectives for the Cheat/Potomac, Greenbrier and Marlinton/White Sulphur RDs, decisions are made as to which locations/areas have gypsy moth populations posing the greatest threat to forest resources and uses. The following treatment decision criteria were utilized to establish which locations/areas would benefit most from suppression of the gypsy moth populations in 2002:

Description of Proposed Treatment Unit Criteria for 2002 Suppression

(1) Predicted gypsy moth defoliation in 2002.
(2) Recent gypsy moth defoliation in 2000 and 2001.
(3) Timber values and degree of tree vulnerability to mortality.
(4) Highly sensitive developed/dispersed recreation and scenic areas.
(5) Retreatment of spray block treated during 2001 suppression project.

8. Boundaries and acreage are determined by MNF and FHP for each proposed treatment unit to achieve maximum suppression of potentially damaging gypsy moth populations through contracting for aerial spraying in May when larva begin feeding.

In 2001, the 14 spray blocks proposed for treatment in 2002 totaled 13,206 acres.

9. MNF notifies the public(s) of the intent of the Forest to conduct a gypsy moth spray project. MNF conducts scoping meetings to further identify issues and concerns to be addressed in a Project EA and Decision Notice, and perhaps identify the need for an EIS beyond the current USDA/FS & APHIS EIS.

10. MNF and FHP jointly will plan and organize a spray project using Incident Command System (ICS) to identify key team members and their responsibilities (develop project activities, schedules, contracting, and procurement of personnel, vehicles, aircraft, supplies, etc.).

11. FHP and MNF have established efficacy standards for gypsy moth suppression. Achieving these standards lowers the damage risk to the respective forest resources potentially impacted by gypsy moth defoliation and mortality. A successful project:

1) protects enough foliage (70 percent or more) to keep trees from refoliating; spray block defoliation is assessed and recorded remotely using aerial methods (sketchmapping, photography, or videography flights) in July;
2) reduces gypsy moth populations by 80 percent or more comparing new egg mass densities of the generation sprayed to that in the following generation;
3) maintains residual gypsy moth populations, assessed using new egg mass densities and eggs per mass, below the densities which lead to Damage Class 3 defoliation.

12. FHP will evaluate the project against these standards and report the results.

The Treatment Monitoring Data Base Protocols and Procedures will be followed for data collection, thereby permitting a standard for comparison with results from similar projects, and making it possible to determine reasons for success or failure on each treatment unit.

13. FHP will develop a risk assessment for non-target biodiversity effects from spraying biological insecticides, and will be responsible for non-target monitoring of those insect species most likely to be effected during the spring of spraying.

Many macrolepidopterous moths have an important ecological role in determining biodiversity of unusual ecosystems, such as those in the Spruce Knob-Seneca Rocks NRA. By surveying the moth fauna likely to be feeding and exposed to insecticides in the proposed treatment units during the time for spraying, FHP will document changes in presence and relative abundance of species considered to be of special concern for their rarity in West Virginia, and/or their listing as federally threatened, endangered, or sensitive. Numerous habitats will be surveyed from March to October under cooperative contracts with the West Virginia Division of Natural Resources, Elkins, WV, and The Carnegie Museum of Natural History, Pittsburgh, PA.

RESULTS AND DISCUSSION

Defoliation Predictions for 2002

Table 1 shows the 2002 gypsy moth defoliation predictions for each of the 35 Survey Unit and the MNF Ranger District where these are located. Table 1 also presents the number of survey plots and their distribution by defoliation classes for each Survey Unit. Expressing this distribution as percent of the total plots for each Survey Unit permits comparisons of predicted gypsy moth defoliation between and among Survey Units. A total of 34 large-scale sections of MNF planimetric maps, arranged alphabetically by Survey Unit, are presented in the Appendix to show where the survey plots are located within each Survey Unit.

The greatest potential for moderate to severe defoliation in 2002 exists within those Survey Units with a defoliation prediction exceeding 50% and having the greatest proportion of survey plots falling within the highest defoliation class. Defoliation of this intensity can lead to permanent tree damage (crown decline, dieback and mortality). The greatest potential for light to moderate defoliation in 2002 exists within those Survey Units with a defoliation prediction below 50% and having the greatest proportion of survey plots in the middle defoliation class. Defoliation of this intensity creates only

larval densities and defoliation at nuisance levels to recreationists. Survey Units with an extremely low defoliation prediction and having the greatest proportion of survey plots in the lowest defoliation class are likely to have no more than innocuous gypsy moth populations.

Gypsy moth populations with the greatest potential for causing permanent tree damage exist in 14 of the 35 Survey Units surveyed on the MNF in 2001. Nearly half (7 of 18) the Survey Units on the Survey Units are likely to experience gypsy moth defoliation resulting in unacceptable amounts of growth loss or tree mortality. By contrast, none (0 of 4) of the Survey Units on the Greenbrier RD is likely to experience this level of defoliation that leads to permanent tree damage.

Of the remaining 21 Survey Units, 5 are likely to experience more defoliation than elsewhere, but defoliation is likely to remain in the lowest defoliation class. Two Survey Units on the Marlinton/White Sulphur RD (Brushy Mt North and South) have a defoliation prediction approaching 50% with a high proportion of survey plots in the middle defoliation class. Three other Survey Units, 1 on the Marlinton/White Sulphur RD (Middle Mt South), and 2 on the Cheat/Potomac RD (Fore Knobs South, Pretty Ridge) have a defoliation prediction approaching 50%, but without a high proportion of survey plots in the middle defoliation class. Where recreation areas are present in these five Survey Units, gypsy moth larvae themselves and the threat of their defoliation, even at these lower defoliation densities, can be expected to adversely influence the recreation experience.

The remaining 16 Survey Units on these three RDs are predicted to have gypsy moth defoliation at low to innocuous levels, and, therefore, gypsy moth populations would not pose a threat to resources in 2002 except for nuisance defoliation in recreation areas.

The natural control factors operating in the Survey Units were not quantitatively surveyed, but observations indicated that gypsy moth egg mass size for new egg masses was moderate to large with an almost constant presence of *Ooencyrtus kuwanae* parasitic wasps on egg masses. Several dead larvae collected during the survey were found to be harboring resting spores of the gypsy moth fungus, *Entomophaga maimaiga*. This fungus is known to be present wherever gypsy moth is distributed in West Virginia, and was considered to have influenced the successful treatment of gypsy moth infestations sprayed on the MNF in 1995. Therefore, it is likely this fungus will again have an adverse influence on gypsy moth infestations on the MNF especially during wet spring weather. The gypsy moth nucleopolyhedrosis virus was also present in the dead larvae collected, but this gypsy moth pathogen does not kill as quickly and is usually masked by the fungus.

Proposed Spray Blocks for 2002

GMIPM seeks to determine where values are at risk from the current gypsy moth infestations so that spray blocks can be established for suppression consideration for 2002. Pre-, and post-suppression egg mass surveys determine gypsy moth population

changes and provide a measure of project effectiveness. In addition, treatment evaluation and non-target lepidopteran monitoring with FHP coordination, insures assessments of forest health impacts resulting from gypsy moth management decisions to spray specified areas. Impacts include those to ecosystem biodiversity and non-target moths in habitats typical of the forest types considered for gypsy moth suppression in this and future years.

Potentially damaging gypsy moth populations in 2002 exist in susceptible forest type within 14 Survey Units (7 on both the Cheat/Potomac RD and Marlinton/White Sulphur RD). Proposed spray blocks within these Survey Units, totaling 13,206 acres and encompassing these gypsy moth infestations, were jointly identified by the MNF and FHP as candidates for spraying in 2002. The spray objective would be to protect forest areas managed for timber, wildlife, recreation, ecosystem biodiversity, and T&ES species. Table 2 presents these proposed spray blocks along with the RD where they are located. Also for each block are shown the acreage, number of survey plots, predicted defoliation, and distribution of survey plots among the defoliation classes. Each block is delineated and labeled with a text box on the Appendix Maps corresponding with the Survey Unit name.

Nine of the proposed spray blocks have a defoliation prediction exceeding 50% with the greatest proportion of survey plots falling within the highest defoliation class. Two proposed spray blocks have a defoliation prediction approaching 50% with the greatest proportion of survey plots in the highest defoliation class. These 11 proposed spray blocks should be considered for treatment in 2002.

Two proposed spray blocks have a defoliation prediction below 50% with the greatest proportion of survey plots in the middle and lowest defoliation class. These two proposed spray blocks should be considered for treatment in 2002, primarily because they were spray blocks in 2001. On the other hand, one proposed spray block had a defoliation prediction well below 50% with the greatest proportion of survey plots in lowest defoliation class. This single proposed spray block should be dropped from further consideration for treatment in 2002.

The gypsy moth infestations on the Cheat/Potomac RD have been in this part of the MNF since the early 1990s, whereas infestations on the Marlinton/White Sulphur RD developed only in the last few years at the leading edge of the generally infested area in West Virginia. The recent history of gypsy moth infestations is one of expansion into this southern part of the MNF with abundant susceptible tree species. Considering these facts and the high density gypsy moth populations found during the surveys for this biological evaluation, FHP predicts that gypsy moth populations will continue to be a chronic problem in the eastern parts of the MNF. Furthermore, gypsy moth populations are likely to spread and build to outbreak densities on the southern end of the MNF over the next several years beyond the general areas discussed in this report.

Treatment Alternatives

The MNF has two gypsy moth management options in 2002 that are responsive to issues identified through NEPA scooping in previous Environmental Assessment for gypsy moth suppression projects.

1) no action against the gypsy moth;
2) spray proposed blocks with microbial insecticides to prevent nuisance, defoliation, and subsequent tree mortality;

For those nine proposed spray blocks with gypsy moth defoliation predictions exceeding 50%, treatment would be expected to prevent moderate to severe defoliation that results in permanent tree damage and loss of susceptible host forest type. For those two proposed spray blocks with gypsy moth defoliation predictions approaching 50%, treatment would be expected to prevent larval nuisance and light to moderate defoliation that adversely affects recreation values and uses.

If the no action alternative is chosen in 2002, outbreak population densities and their accompanying defoliation predictions within the 11 proposed spray blocks are likely to cause moderate to severe defoliation and have adverse impacts for national forest resources. Of the natural controls of gypsy moth from parasitic wasps, NPV and fungus, only the latter pathogen is likely to cause a major collapse in the outbreak if wet weather coincidences with larval feeding in the late spring. A large portion of the current gypsy moth infestations lies in the leading edge of the generally infested area along the southward expansion of gypsy moth. It is under these circumstances that increased risks from the expanding outbreaks can most impact the forest by increasing tree mortality, especially in oak type, especially where stands have been defoliated during one or more previous years.

RECOMMENDATIONS

It is recommended that MNF decide in favor of the spray treatment alternative. National Forest resource values, such as, recreation, timber, wildlife, species biodiversity and T&ES species, would be protected by suppressing potentially damaging gypsy moth populations in areas of the Cheat/Potomac RD and Marlinton/White Sulphur RD where these values are at greatest risk. This decision would prevent additional unacceptable damage to forest resources values and uses caused by the moderate to severe gypsy moth defoliation likely during 2002, especially those areas defoliated in 2000 and 2001.

APPENDIX

Gypsy Moth Egg Mass Survey Method and Datasheet

Table 1. Monongahela NF 2002 Gypsy Moth Defoliation Predictions by Survey Unit

Table 2. Monongahela NF 2002 Gypsy Moth Defoliation Predictions by Spray Block

Monongahela NF 2001 Gypsy Moth Egg Mass Survey Maps by Survey Unit showing the Location of Survey Plots by Defoliation Prediction Class and Spray Blocks Treated in 2001 and Proposed for 2002

Gypsy Moth Egg Mass Survey Method and Datasheet

Survey Planning: Delineate the area to be surveyed on a 1:24000 quadrangle topographic map and distribute the plot such that the entire survey area will be sampled. The number of sample points will be based on available time and desired precision but a rule of thumb is a minimum of 4 plots per 25 acres (+) 1 additional plot per 25 acres to be surveyed.

Materials needed: binoculars, compass, 5 stakes, 18.6 foot tape/string, tree identification guide, data sheets, map of site calculator.

1) **Navigate to the survey plot.** The plot should lie within a forested area (with susceptible host species) and be more than 25 feet from the edge of the forest.

2) **Select the center point of your plot.** This should be done *randomly*. Do not place your cent point in areas where egg masses are clumped in high densities.

3) **Set up your plot.** Use a tape/string to set up stakes to help you visualize a circular plot. Measure 18.6 feet out in four directions, perpendicular to each other, from your selected center point, setting a flagged stake at each point.

   PLEASE ASSESS THIS ITEM CAREFULLY – You will need to determine **new from old egg masses**. Examine egg masses by gently pressing them with your finger. New egg masses feel full, and contain tiny hard eggs that will 'pop' between fingernails. Old egg masses look very similar to new ones, however, old egg masses will usually appear lighter in color unless they have been sheltered from the sun and weather. Old egg masses collapse when touched – they feel flat and empty and contain few, if any eggs. Old egg masses will sometimes appear torn or have holes in them and will not "pop" when squeezed between fingernails.

4) **Enter basic information on the data sheet.** Add the crew block number, plot number date, and the names of members to the top of the data sheet.

   You will need to **measure 5 NEW egg masses** for their length. Randomly select five egg masses – they can be the first 5-10 you observe if you wish. Measure the longest extent of the egg mass as its length in millimeters (mm). Length is generally measured up-and down on the side of trees, but on limbs and understory materials, they can extend in any direction. Enter these on the bottom of the data sheet. If you fail to find at least 5 inside your plot, find and measure egg masses nearby if possible.

5) **Count and tally old and new egg masses in the understory.** Look on smaller trees, woody vegetation, downed limbs and logs. Egg masses may be found under peeling bits of bark and in dead tree cavities as well. Look only on the larger objects, there is no need to pick up every twig but be through. Replace any items you move back where they were originally to impact habitat as little as possible.

6) **For each large tree within your plot:**

   a) **Enter the number of the tree within your plot:**

b) **Identify the tree** to species if possible using common name (e.g., black oak). Identification to major taxonomic group (e.g., oak vs. maple) is sufficient for this survey.

c) **Measure/estimate the diameter in inches** (width) of the tree at chest level. Enter this in the column marked DBH (for Diameter at Breast Height).

d) **General guidance for counting:** Count <u>all</u> egg masses in understory and below 6' on plot trees. Count individual egg masses above 6' on plot trees up to 50. After you have 50 counted you may begin to estimate numbers in groups of 25. Example: If you count 50 in total (above 6 feet) and there are still plenty more, estimate in 25s for the rest of the count on that tree.

e) **Count and tally all old and new egg masses in understory/ground and below 6 feet on plot trees. Enter results on the data sheet. Avoid double counting.**

If there are no egg masses on ground, understory or below 6 ft in the plot and in order to determine **% new versus old egg masses,** you will need to go outside the plot to find egg masses to determine this ratio, but do not incorporate these egg masses into the plot data itself, use it only to determine % new egg masses. (Example: no egg masses below 6', outside of plot 10 egg masses found, 5 of which are new. Record % new but do not add the number of egg masses to the total count.

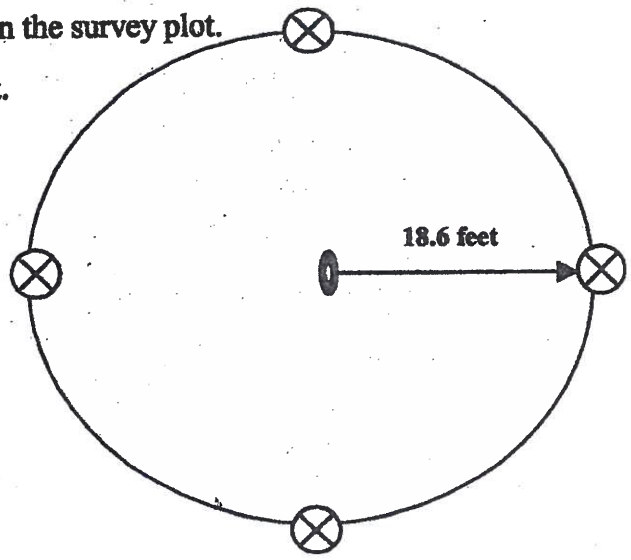
f) **Count egg masses above 6 feet.** Count all egg masses on plot trees, even on branches that may extend beyond your plot. Do not include egg masses noted on overhead branches from trees with trunks that are outside your plot. Use binoculars as necessary – egg masses may be at any height

Note: If you observe no egg masses under 6 ft, and you were unable to find any adjacent to the plot, you will need to determine the number of new egg masses without the new vs old ratio. To do this you will need be very careful and try to determine if the egg mass is new by sight only, paying close attention to color and condition of the egg mass. Has the color faded? Is it full of holes? Is it torn looking? In this situation you will be counting only new egg masses so enter 100% new egg masses on the data sheet.

g) **Total the number of egg masses** on this tree in the last column.

h) **Repeat for all larger trees** that have trunks in the survey plot.

7) **Gather stakes and continue on** to your next plot.



1/40 ACRE EGG MASS SURVEY PLOTS (r = 18.6 Ft)

LOCATION: _____

DATE: _____ BLOCK (or other ID): _____

CREW: _____ PLOT # _____ GPS Coordinates _____

Tree #	Species	DBH	Total Number of Egg Masses (old + new) above 6′		
Understorey & Ground Plot Trees Below 6′			New	Old	
		GRAND TOTALS			

$$\frac{\text{New}}{\text{New+ Old}} = \text{\%NEW egg masses}$$

Total NEW Above 6′ = Grand total Above 6′ x (% New)

% NEW egg masses _____

Total NEW Above 6′ _____

PLUS (+) Total NEW in understorey /ground below 6 feet _____

TOTAL NEW EGG MASSES = _____

X 40

Total egg masses per acre | | |

Egg Mass Size (measure length in millimeters)

(Measure only new egg masses)

COMMENTS: fungus/, parasites?

(Do not calculate)

Monongahela NF 2002 Gypsy Moth Defoliation Predictions by Survey Unit showing Distribution of Plots by Defoliation Classes within each Survey Unit

Class 1 = No Defoliation; Class 2 = 1-50 % Defoliation; Class 3 = 51-100 % Defoliation

Monongahela National Forest Ranger District	Survey Unit Name	Survey Plots	% Predicted Defoliation	Map Symbol: % Plots Class 1	% Plots Class 2	% Plots Class 3
Marlinton-Wh.Sulphur	Allegheny Mt	11	24	45	36	18
Marlinton-Wh.Sulphur	Beaver Lick Mt	26	2	92	8	0
Cheat-Potomac	Big Mt	41	34	48	15	37
Marlinton-Wh.Sulphur	Brushy Mt North	25	46	4	60	36
Marlinton-Wh.Sulphur	Brushy Mt South	46	43	11	52	37
Marlinton-Wh.Sulphur	Buckley Mt	74	71	4	16	80
Cheat-Potomac	Cave Mt	49	54	26	14	60
Greenbrier	Chestnut Ridge	10	12	80	10	10
Marlinton-Wh.Sulphur	Elk River	11	0	100	0	0
Cheat-Potomac	Fore Knobs Cable	47	75	3	14	83
Cheat-Potomac	Fore Knobs Middle	17	54	23	18	59
Cheat-Potomac	Fore Knobs North	36	59	3	31	66
Cheat-Potomac	Fore Knobs South	19	46	32	16	52
Marlinton-Wh.Sulphur	Grindstone Knob	15	62	0	33	67
Marlinton-Wh.Sulphur	High Top	18	68	0	28	72
Marlinton-Wh.Sulphur	Lake Sherwood	26	17	58	30	12
Greenbrier	Lee Bell North	36	28	47	22	31
Greenbrier	Lee Bell South	22	22	55	32	13

Monongahela NF 2002 Gypsy Moth Defoliation Predictions by Survey Unit showing Distribution of Plots by Defoliation Classes within each Survey Unit

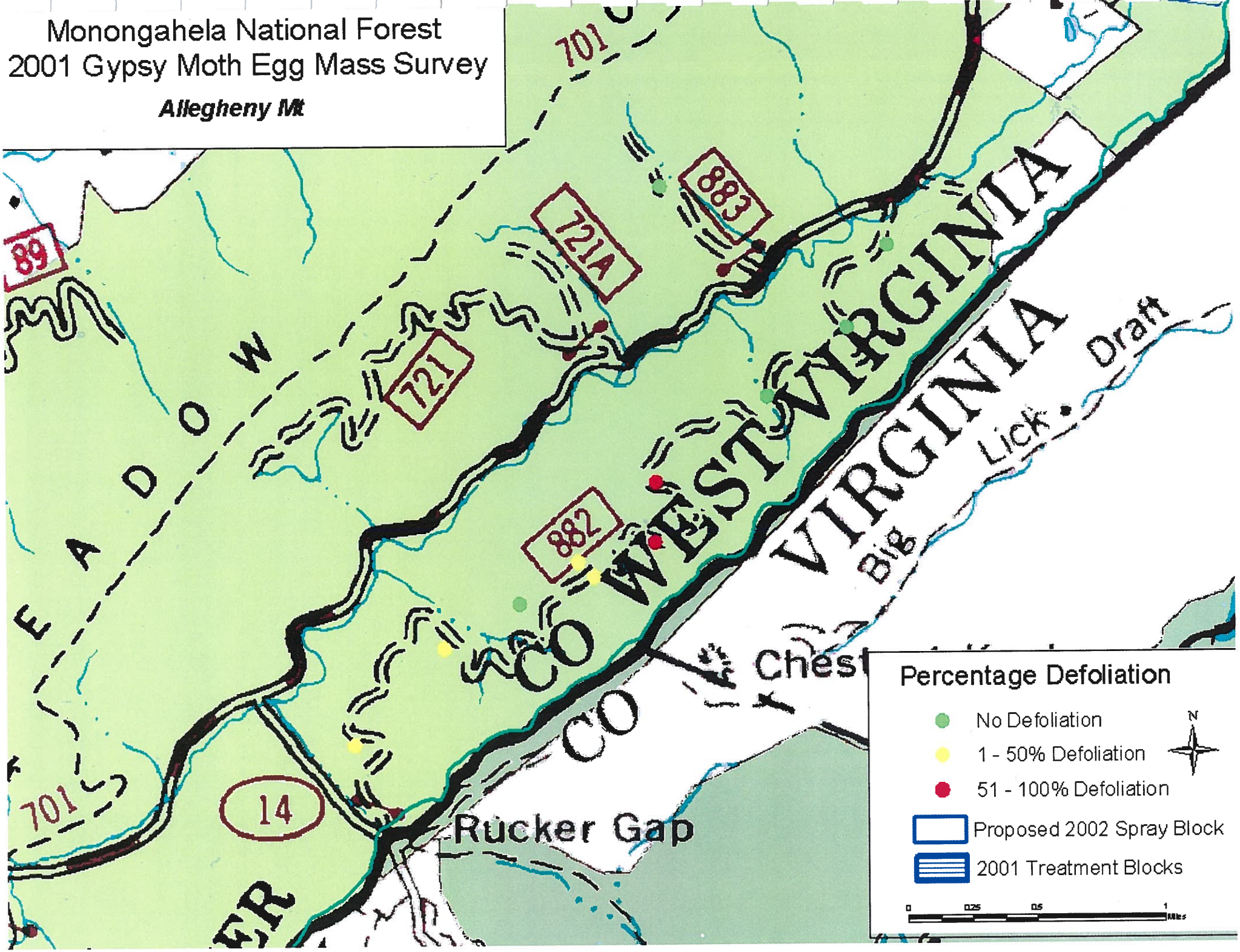
Class 1 = No Defoliation; Class 2 = 1-50 % Defoliation; Class 3 = 51-100 % Defoliation

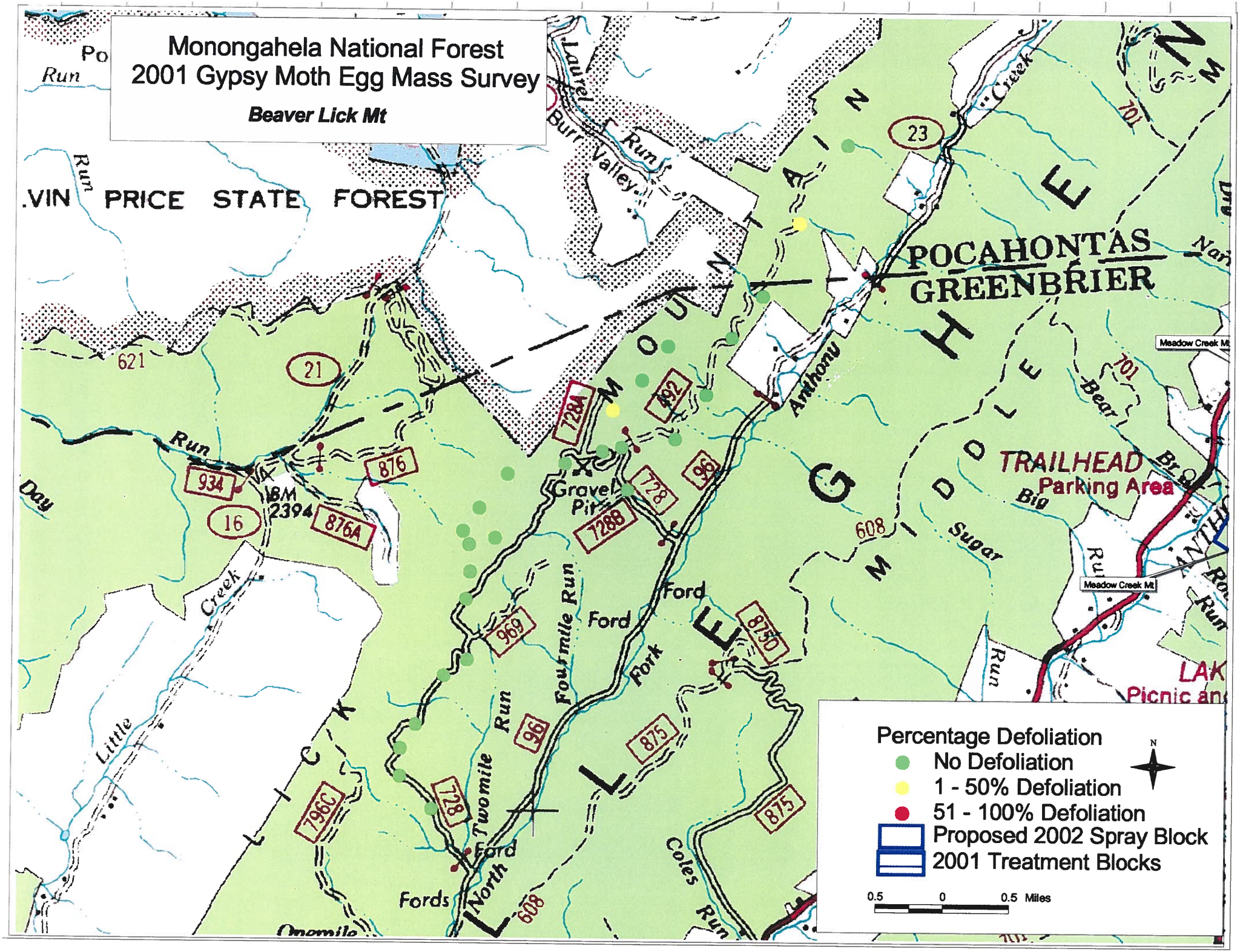
Monongahela National Forest Ranger District	Survey Unit Name	Number of Plots	% Predicted Defoliation	Map Symbol: % Plots Class 1	% Plots Class 2	% Plots Class 3
Marlinton-Wh.Sulphur	Lockridge Mt	59	20	49	41	10
Marlinton-Wh.Sulphur	Mad Tom Knob	12	70	0	25	75
Marlinton-Wh.Sulphur	Marlin Mt	56	64	7	20	73
Marlinton-Wh.Sulphur	Meadow Creek Mt	61	75	2	8	90
Marlinton-Wh.Sulphur	Michael Mt	18	11	67	28	5
Marlinton-Wh.Sulphur	Middle Mt North	61	69	3	22	75
Marlinton-Wh.Sulphur	Middle Mt South	24	42	33	25	42
Cheat-Potomac	North Fork Mt Middle	39	65	10	23	67
Cheat-Potomac	North Fork Mt North	65	59	8	26	66
Cheat-Potomac	North Fork Mt South	12	10	67	33	0
Marlinton-Wh.Sulphur	Paddy Knob	13	2	92	8	0
Cheat-Potomac	Peters Mt	17	39	24	29	47
Cheat-Potomac	Pretty Ridge	11	43	55	0	45
Cheat-Potomac	Seneca Rocks	20	22	55	25	20
Mar.-W.S./Greenbrier	Sugar Camp	24	5	83	17	0
Marlinton-Wh.Sulphur	Thorny Creek	14	13	64	29	7
Cheat-Potomac	Tract Hill	26	66	8	19	73

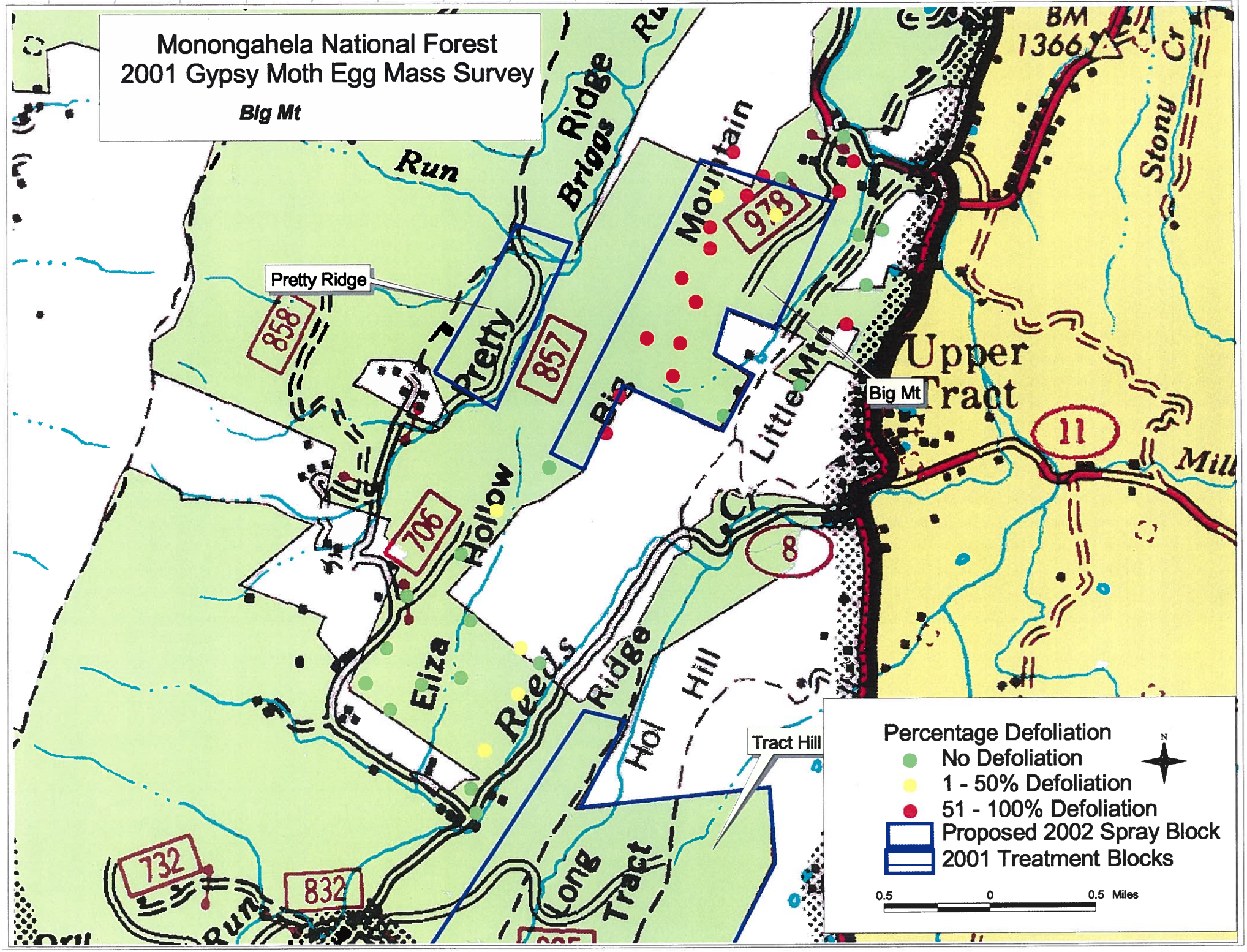
Monongahela NF 2002 Gypsy Moth Defoliation Predictions by Proposed Spray Blocks showing Distribution of Plots by Defoliation Classes within each Block

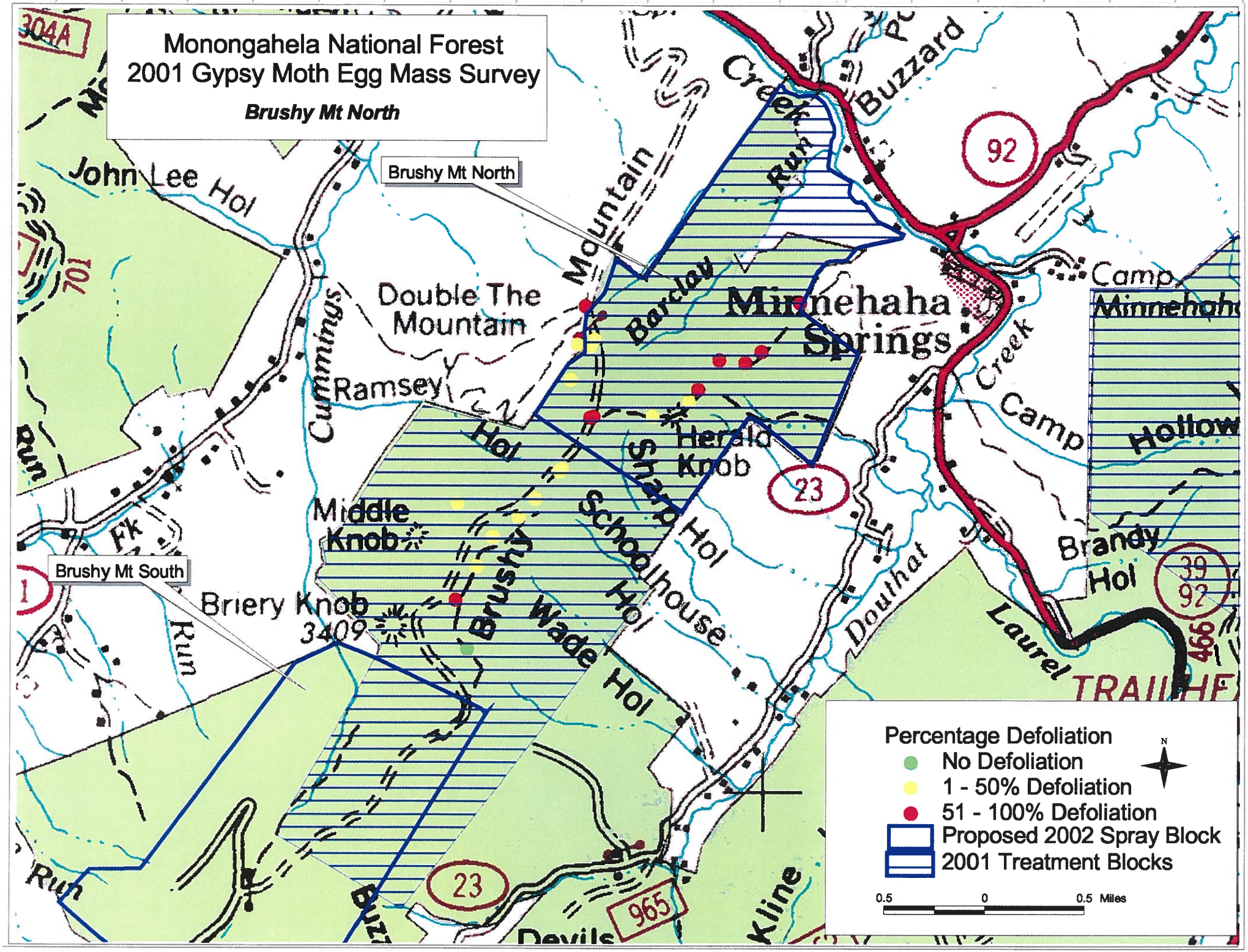
Class 1 = No Defoliation; Class 2 = 1-50 % Defoliation; Class 3 = 51-100 % Defoliation

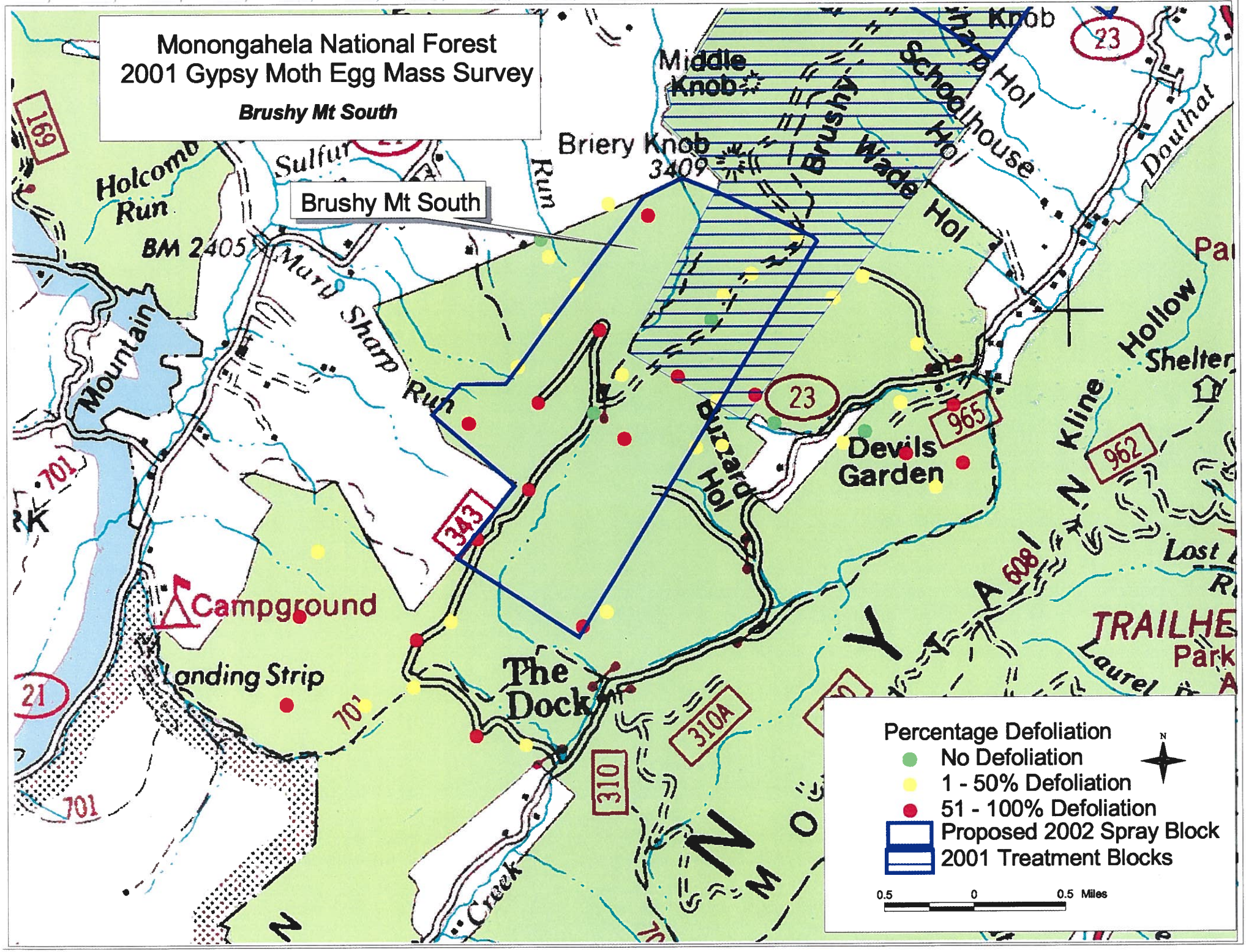
Monongahela National Forest Ranger District	Proposed Spray Block Name	Acres	Survey Plots	% Predict. Defoliation	Map Symbol: % Plots Class 1	Map Symbol: % Plots Class 2	Map Symbol: % Plots Class 3
Cheat-Potomac	Big Mt	509	14	64	14	14	71
Marlinton-Wh.Sulphur	Brushy Mt North	1165	12	50	0	42	58
Marlinton-Wh.Sulphur	Brushy Mt South	1580	13	46	15	23	62
Cheat-Potomac	Cave Mt North	654	10	54	0	50	50
Cheat-Potomac	Cave Mt South	1070	20	80	5	10	85
Cheat-Potomac	Eagle Rock	84	7	12	86	0	14
Cheat-Potomac	Fore Knobs Cable	986	25	82	0	0	100
Greenbrier	Lee Bell North	369	19	30	42	26	32
Greenbrier	Lee Bell South	402	15	32	33	47	20
Marlinton-Wh.Sulphur	Meadow Creek Mt	4625	59	75	2	8	90
Cheat-Potomac	North Fork Mt Lookout	320	11	88	0	0	100
Cheat-Potomac	North Fork Mt Redman	193	5	54	40	0	60
Cheat-Potomac	Pretty Ridge	63	5	57	40	0	60
Cheat-Potomac	Tract Hill	1093	21	74	5	10	86


Monongahela National Forest
2001 Gypsy Moth Egg Mass Survey
Allegheny Mt
701
89
721A
883
721
882
14
701
Rucker Gap
Draft
Lick
Big
Percentage Defoliation
No Defoliation
1 - 50% Defoliation
51 - 100% Defoliation
Proposed 2002 Spray Block
2001 Treatment Blocks
N


Monongahela National Forest
2001 Gypsy Moth Egg Mass Survey
Beaver Lick Mt
.VIN PRICE STATE FOREST
POCAHONTAS
GREENBRIER
MOUNTAIN
MIDDLE
TRAILHEAD
Parking Area
Meadow Creek Mt
Gravel Pit
Ford
Fork
Fourmile Run
Twomile Run
North Fork
Little
Creek
Fords
Coles Run
Laurel Burr Valley Run
Anthony
Bear
Big Sugar
621
21
23
16
934
876
876A
728A
728
728B
492
96
608
969
875
875O
796C
701
Percentage Defoliation
No Defoliation
1 - 50% Defoliation
51 - 100% Defoliation
Proposed 2002 Spray Block
2001 Treatment Blocks
N
0.5 0 0.5 Miles

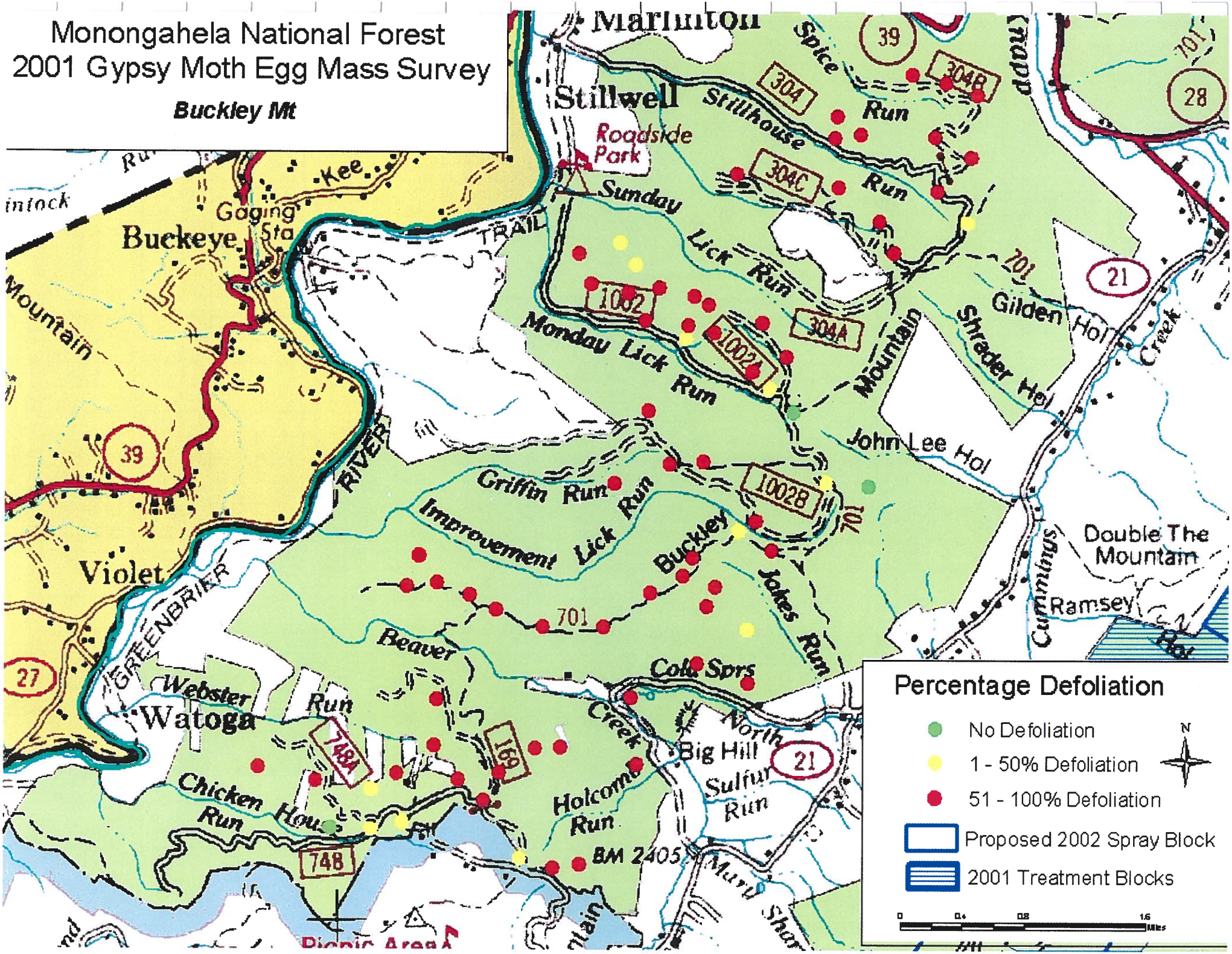

Monongahela National Forest
2001 Gypsy Moth Egg Mass Survey
Big Mt
Pretty Ridge
Big Mt
Upper Tract
Tract Hill
Percentage Defoliation
No Defoliation
1 - 50% Defoliation
51 - 100% Defoliation
Proposed 2002 Spray Block
2001 Treatment Blocks
0.5 0 0.5 Miles
N
Briggs Ridge
Mountain
Pretty Run
Big Little Mtn
Eliza Hollow
Reeds Ridge
Long Tract
Stony Cr
BM 1366
978
858
857
706
732
832
11
8

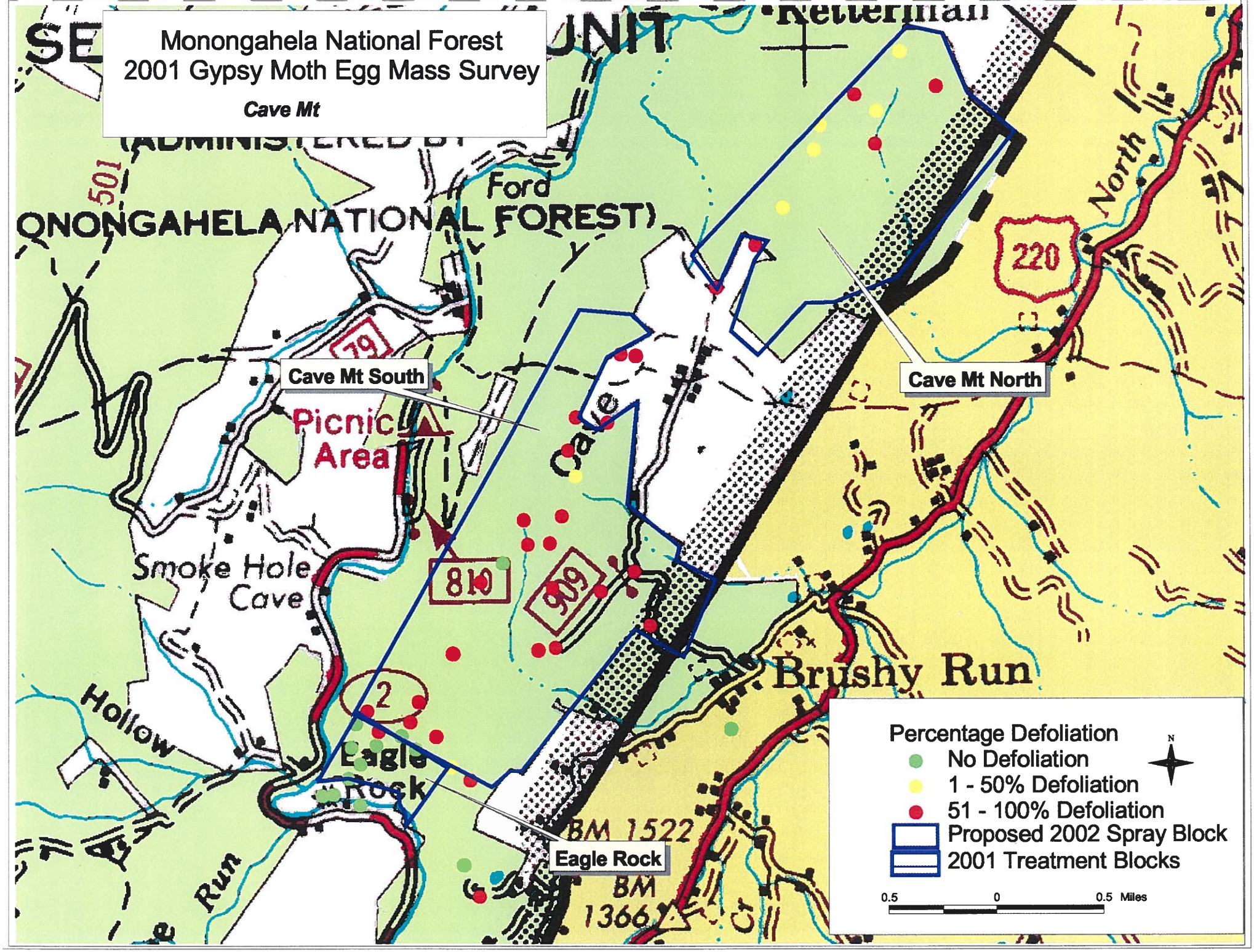

Monongahela National Forest
2001 Gypsy Moth Egg Mass Survey
Brushy Mt North
Brushy Mt North
Brushy Mt South
John Lee Hol
Double The Mountain
Ramsey
Cummings
Mountain
Barclay
Minnehaha Springs
Camp
Creek
Buzzard
Run
92
23
Herald Knob
Middle Knob
Briery Knob
3409
Brushy Run
Wade Hol
Schoolhouse Hol
Douthat
Brandy Hol
Laurel
965
Kline
Percentage Defoliation
No Defoliation
1 - 50% Defoliation
51 - 100% Defoliation
Proposed 2002 Spray Block
2001 Treatment Blocks
0.5 0 0.5 Miles
N

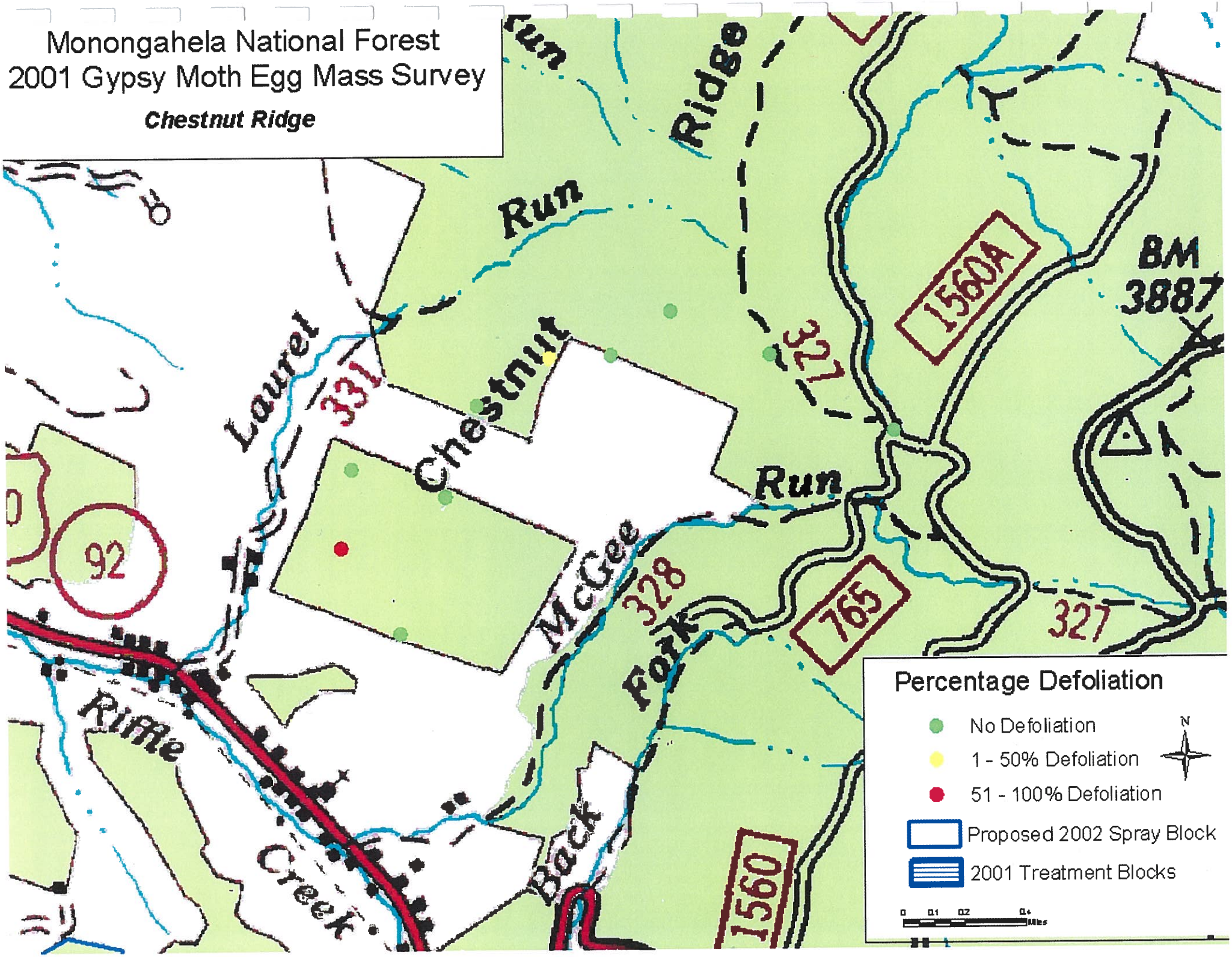

Monongahela National Forest
2001 Gypsy Moth Egg Mass Survey
Brushy Mt South
Brushy Mt South
Briery Knob
3409
Middle Knob
Holcomb Run
BM 2405
Mary Sharp Run
Mountain
Sulfur
Run
Brushy Wade Hol
Schoolhouse Hol
Buzzard Hol
Devils Garden
Campground
Landing Strip
The Dock
Creek
Hollow
Shelter
Kline
Lost
TRAILHE
Park
Laurel
169
701
343
23
965
962
608
310
310A
21
70'
Percentage Defoliation
No Defoliation
1 - 50% Defoliation
51 - 100% Defoliation
Proposed 2002 Spray Block
2001 Treatment Blocks
0.5 0 0.5 Miles

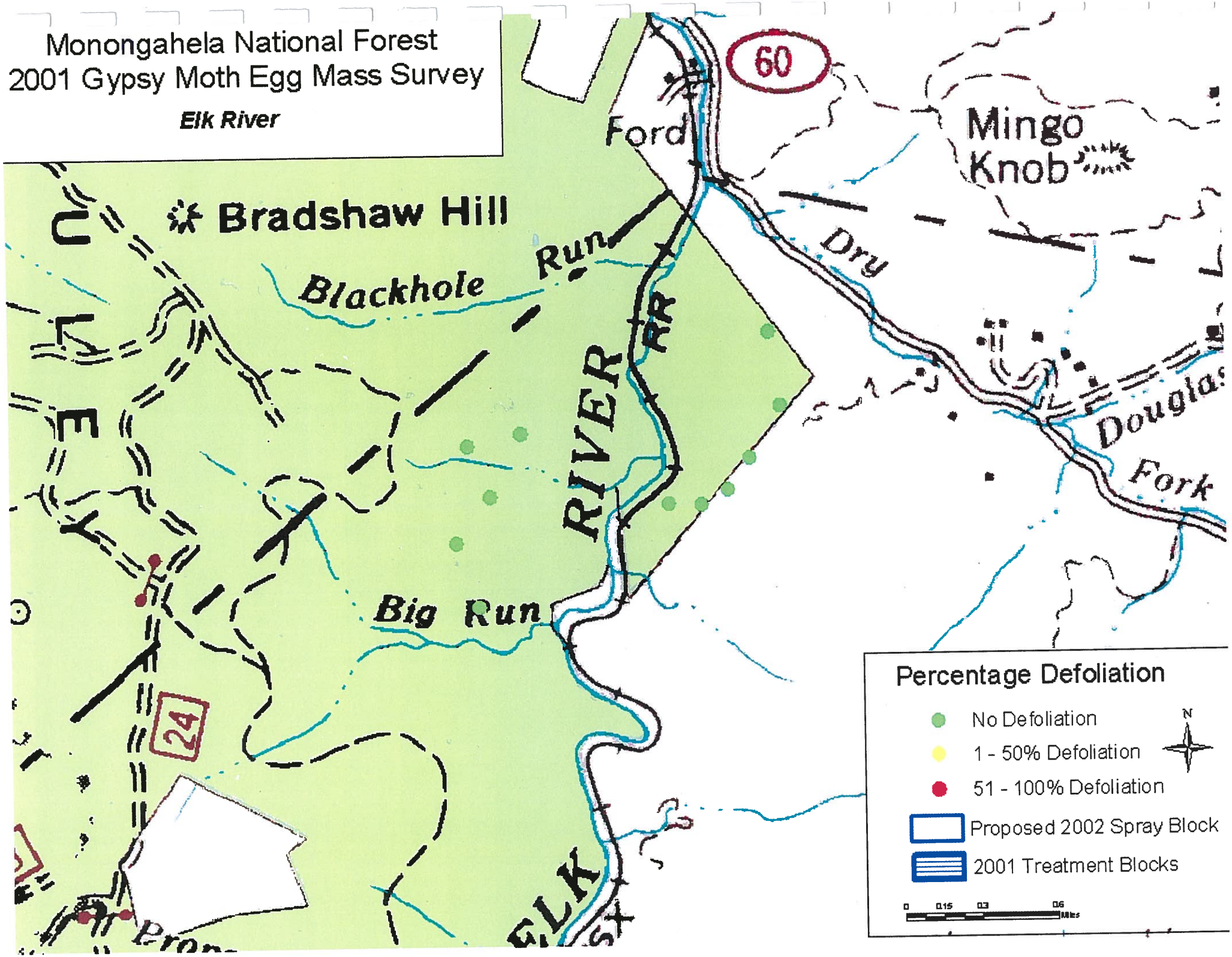
Monongahela National Forest
2001 Gypsy Moth Egg Mass Survey

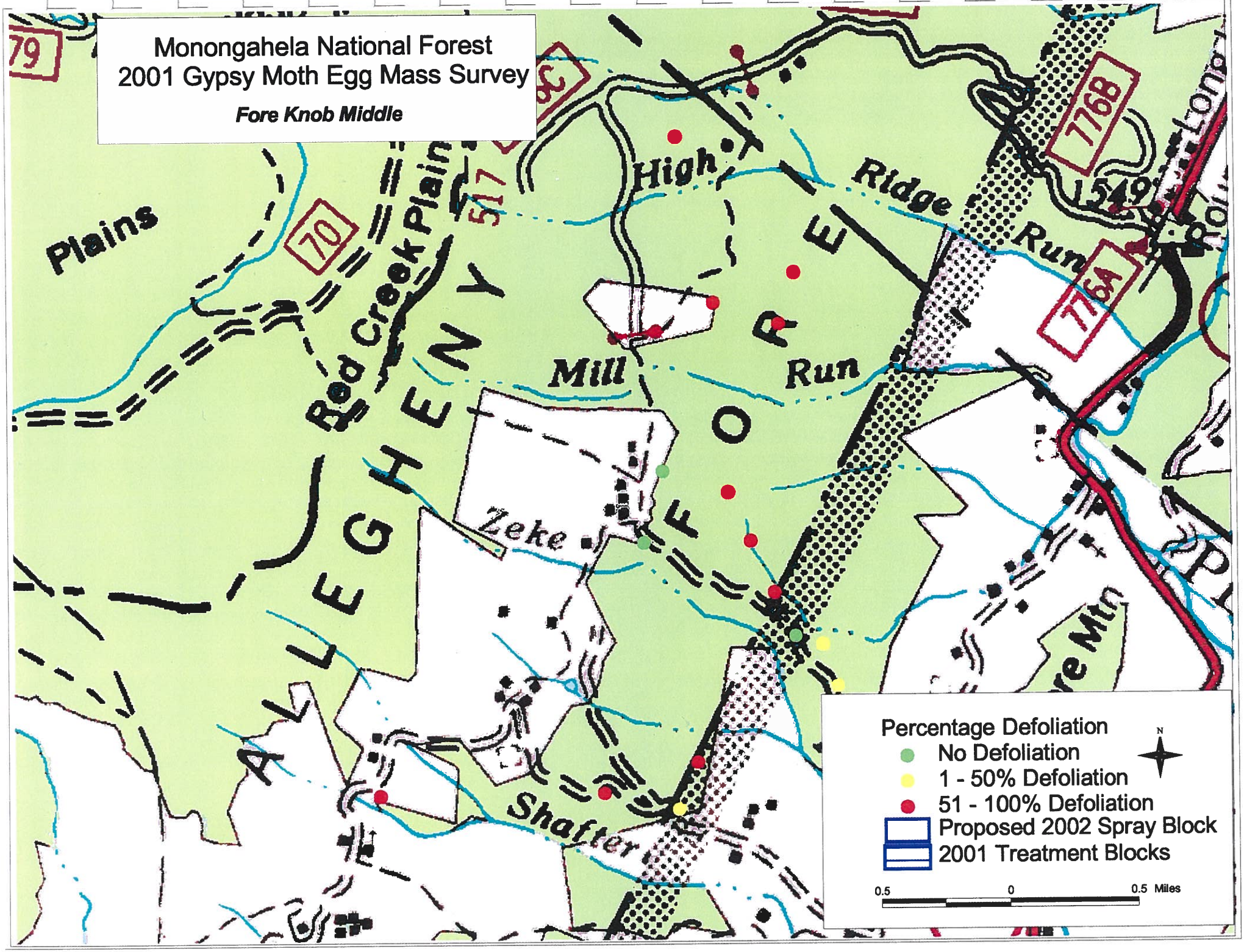
Buckley Mt

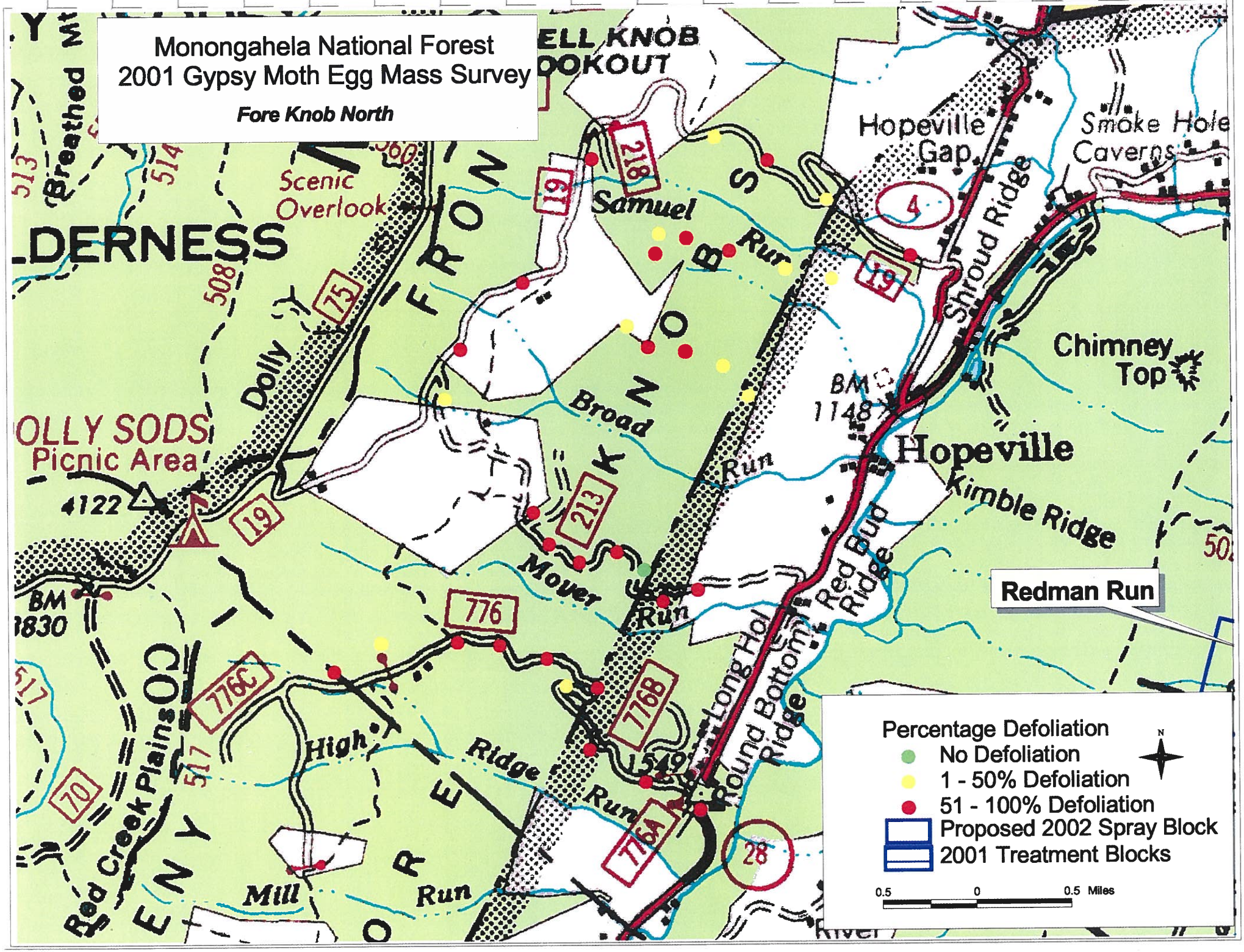


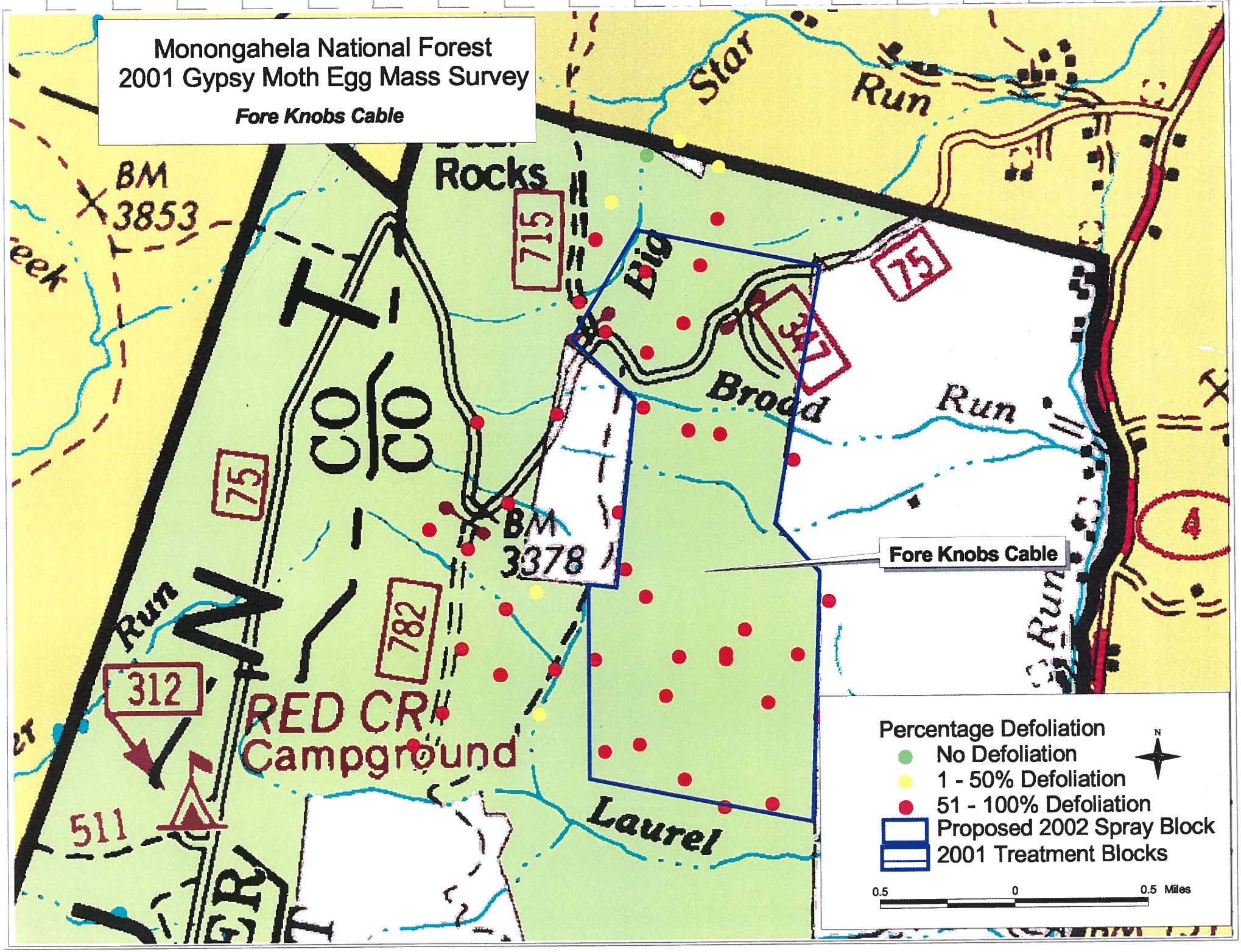

Monongahela National Forest
2001 Gypsy Moth Egg Mass Survey
Cave Mt
Cave Mt South
Cave Mt North
Eagle Rock
Picnic Area
Smoke Hole Cave
Brushy Run
Hollow
Run
Ford
North
501
79
220
810
909
2
BM 1522
BM 1366
Percentage Defoliation
No Defoliation
1 - 50% Defoliation
51 - 100% Defoliation
Proposed 2002 Spray Block
2001 Treatment Blocks
0.5
0
0.5 Miles
N

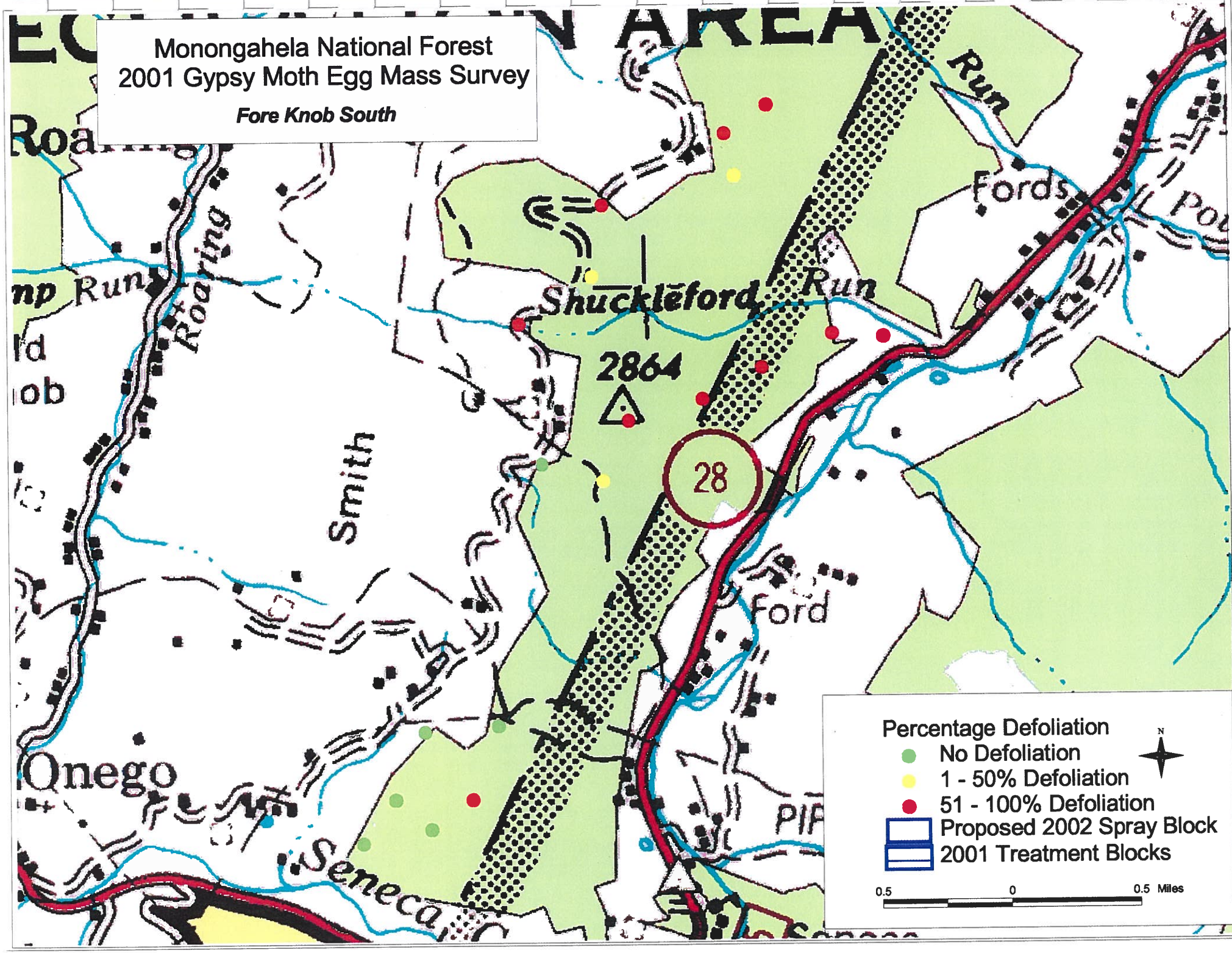

Monongahela National Forest
2001 Gypsy Moth Egg Mass Survey
Chestnut Ridge
Ridge
Run
Laurel
Chestnut
Run
McGee
Fork
Back
Rifle
Creek
331
328
327
323
92
765
1560A
1560
BM
3887
Percentage Defoliation
No Defoliation
1 - 50% Defoliation
51 - 100% Defoliation
Proposed 2002 Spray Block
2001 Treatment Blocks
N
0 0.1 0.2 0.4
Miles

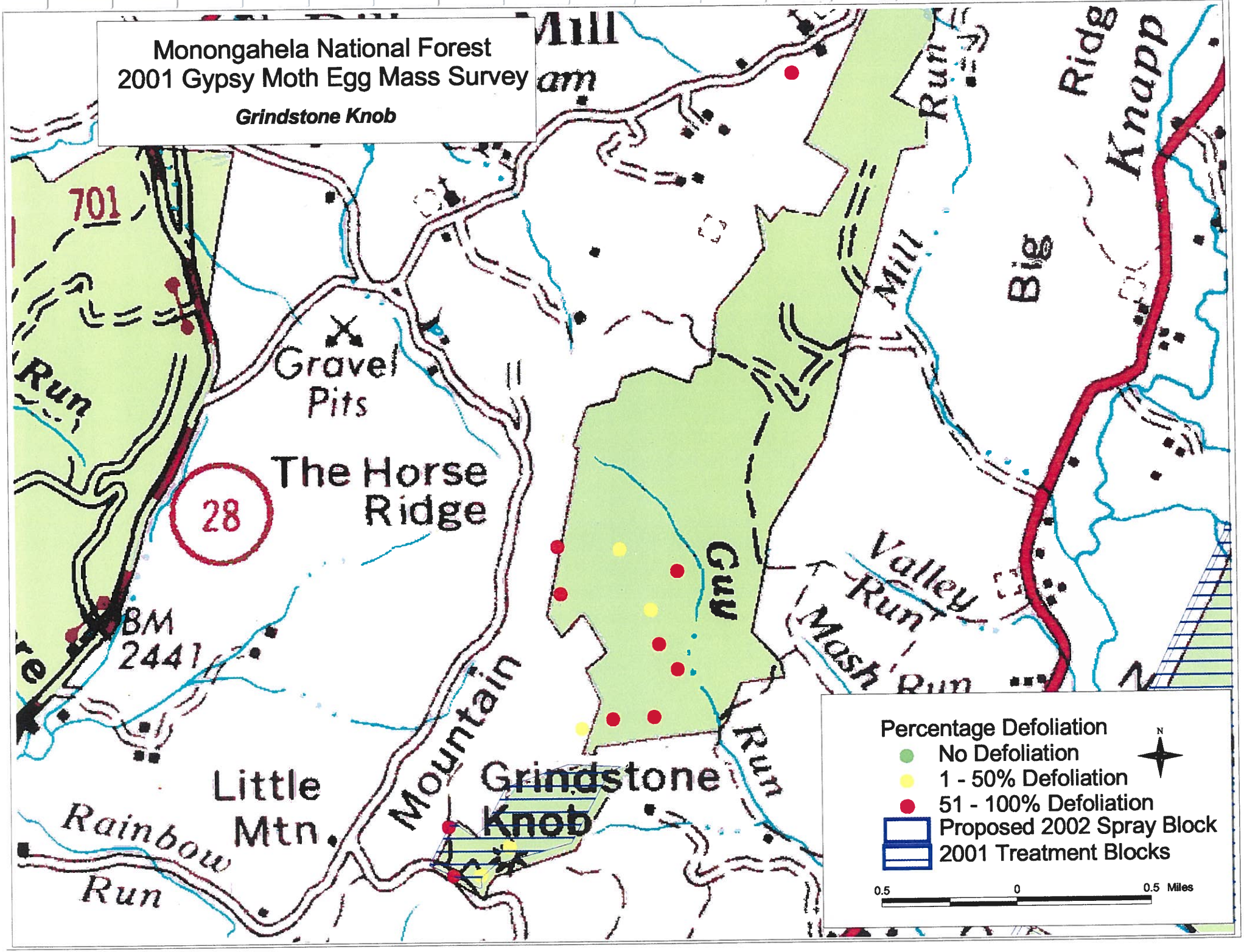

Monongahela National Forest
2001 Gypsy Moth Egg Mass Survey
Elk River
Bradshaw Hill
Blackhole Run
Big Run
ELK RIVER
RR
Ford
60
Mingo Knob
Dry
Douglas
Fork
24
Percentage Defoliation
No Defoliation
1 - 50% Defoliation
51 - 100% Defoliation
Proposed 2002 Spray Block
2001 Treatment Blocks
N
0 0.15 0.3 0.6
Miles

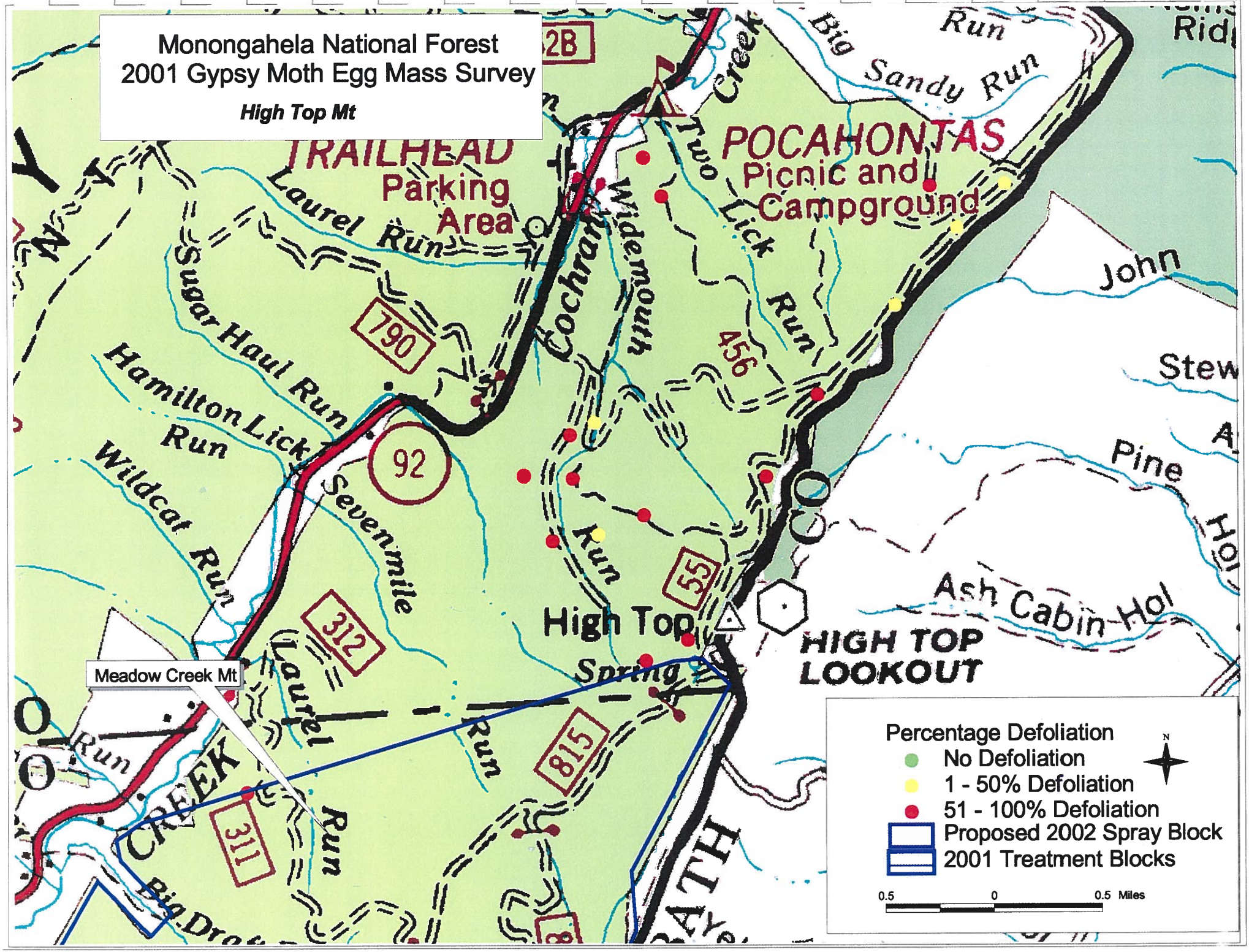

Monongahela National Forest
2001 Gypsy Moth Egg Mass Survey
Fore Knob Middle
79
70
517
Plains
Red Creek Plain
High
Ridge
Run
7768
7764
Mill
Run
ALLEGHENY
FOR
Zeke
Shafter
Percentage Defoliation
No Defoliation
1 - 50% Defoliation
51 - 100% Defoliation
Proposed 2002 Spray Block
2001 Treatment Blocks
N
0.5
0
0.5 Miles

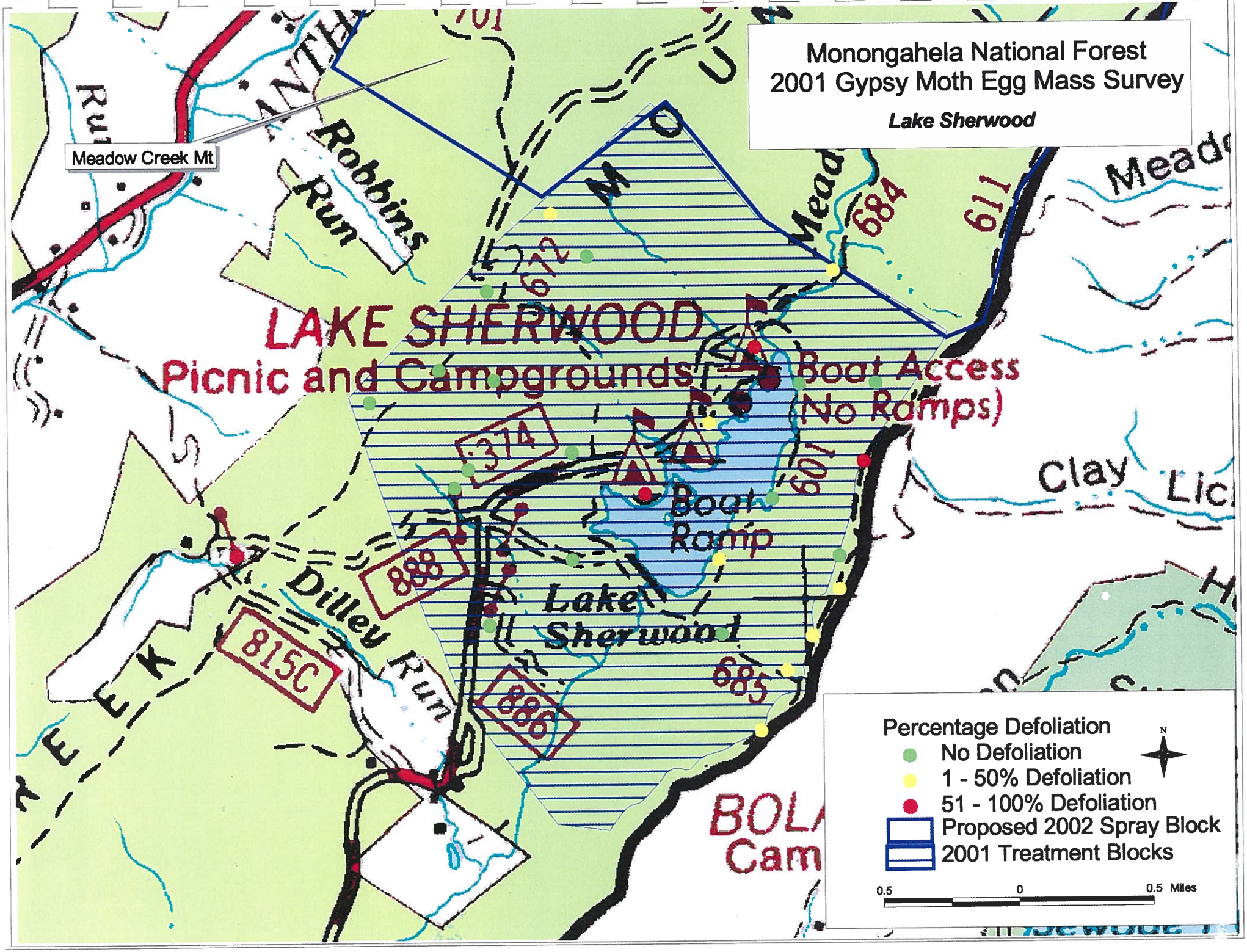

Monongahela National Forest
2001 Gypsy Moth Egg Mass Survey
Fore Knob North
Scenic Overlook
Dolly Sods Picnic Area
Samuel Run
Broad Run
Mower Run
Mill Run
High Ridge Run
Red Creek Plains
Hopeville Gap
Smoke Hole Caverns
Shroud Ridge
Chimney Top
Hopeville
Kimble Ridge
Red Bud Ridge
Round Bottom Ridge
Redman Run
Percentage Defoliation
No Defoliation
1 - 50% Defoliation
51 - 100% Defoliation
Proposed 2002 Spray Block
2001 Treatment Blocks
0.5 0 0.5 Miles

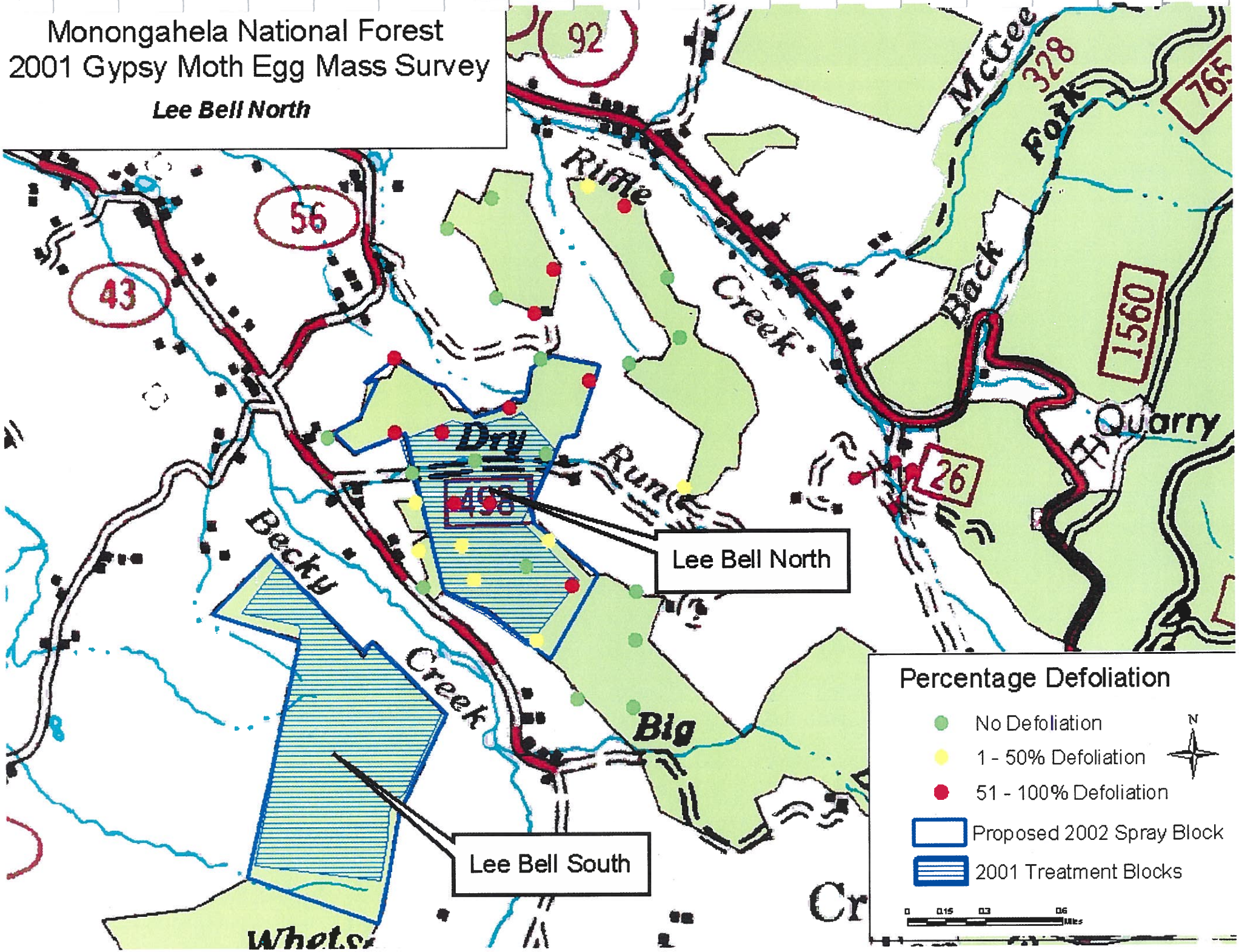

Monongahela National Forest
2001 Gypsy Moth Egg Mass Survey
Fore Knobs Cable
Star
Run
Rocks
BM
3853
715
Big
Broad
Run
75
347
BM
3378
Fore Knobs Cable
782
312
RED CR
Campground
511
Laurel
Run
4
Percentage Defoliation
No Defoliation
1 - 50% Defoliation
51 - 100% Defoliation
Proposed 2002 Spray Block
2001 Treatment Blocks
N
0.5
0
0.5 Miles

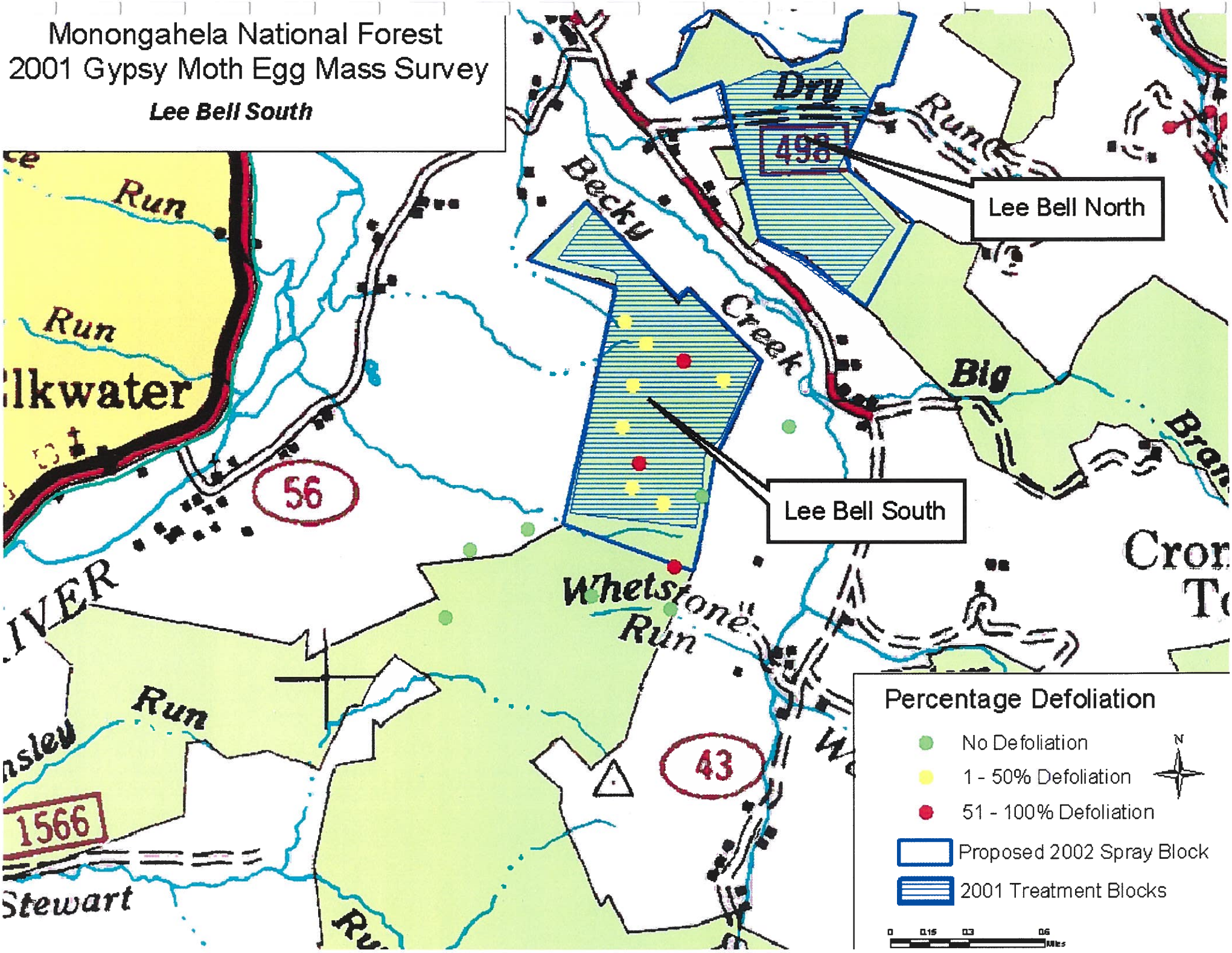

Monongahela National Forest
2001 Gypsy Moth Egg Mass Survey
Fore Knob South
Roaring
Run
Fords
Shuckleford
Run
2864
28
Smith
Ford
Onego
Seneca
Percentage Defoliation
No Defoliation
1 - 50% Defoliation
51 - 100% Defoliation
Proposed 2002 Spray Block
2001 Treatment Blocks
N
0.5
0
0.5 Miles

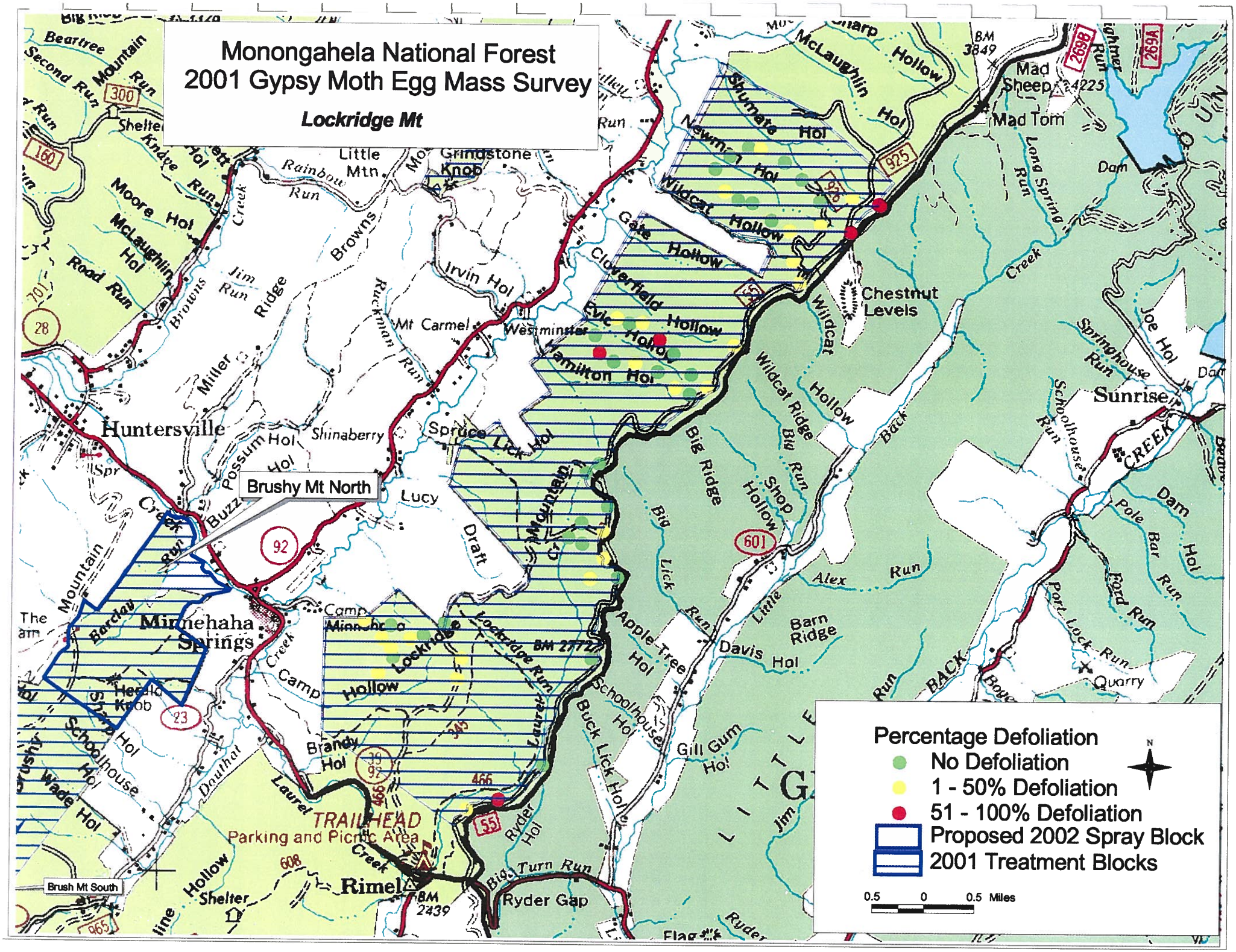

Monongahela National Forest
2001 Gypsy Moth Egg Mass Survey
Grindstone Knob
701
Gravel Pits
The Horse Ridge
28
BM 2441
Little Mtn.
Rainbow Run
Mountain
Grindstone Knob
Run
Gum
Valley Run
Mash Run
Mill Run
Big
Knapp
Ridg
Percentage Defoliation
No Defoliation
1 - 50% Defoliation
51 - 100% Defoliation
Proposed 2002 Spray Block
2001 Treatment Blocks
N
0.5
0
0.5 Miles

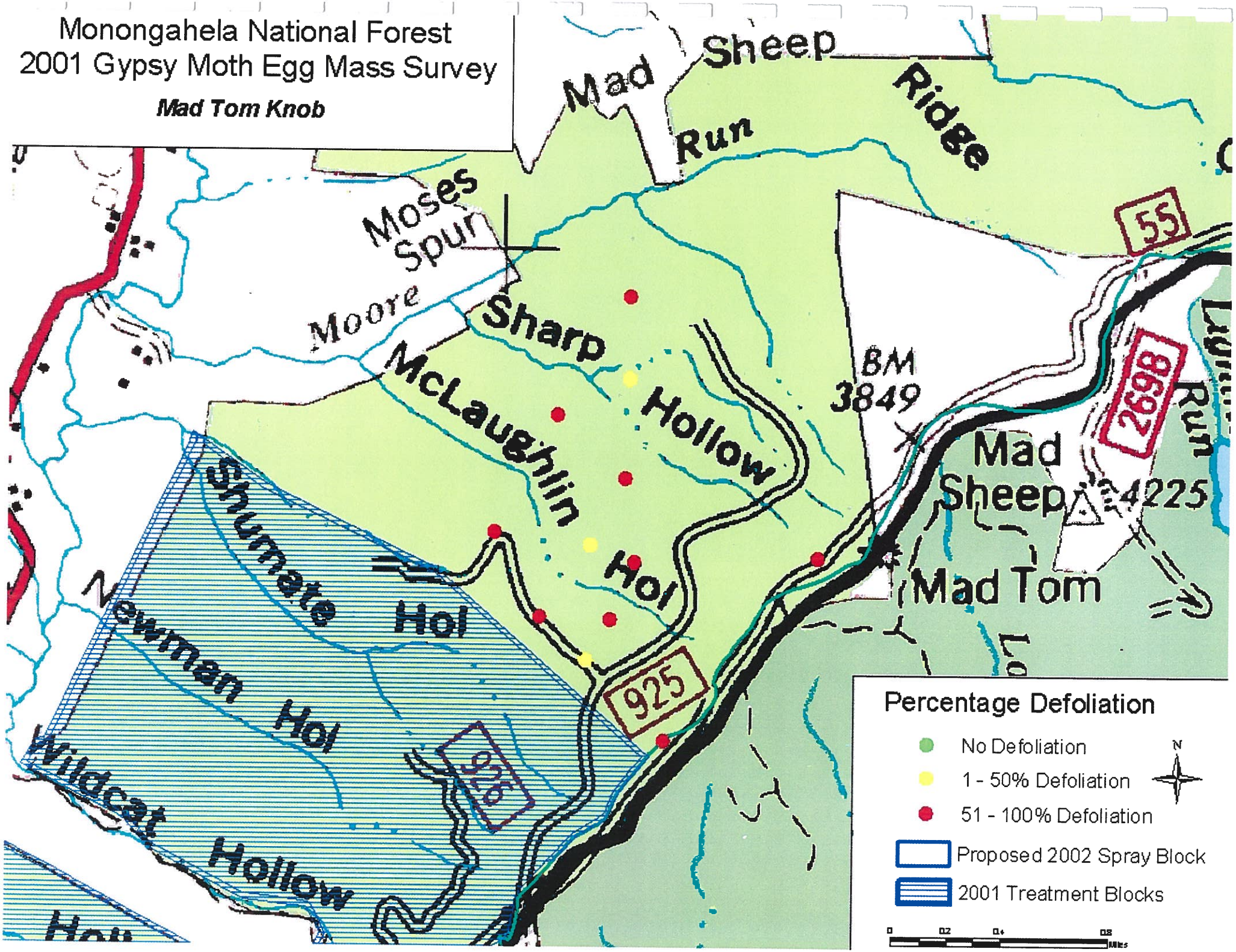

Monongahela National Forest
2001 Gypsy Moth Egg Mass Survey
High Top Mt
TRAILHEAD
Parking
Area
POCAHONTAS
Picnic and
Campground
Laurel Run
Sugar Haul Run
Hamilton Lick
Run
Wildcat Run
Sevenmile
Run
Cochran
Widemouth
Two Lick Run
Big Sandy Run
John
Pine
Ash Cabin Hol
HIGH TOP
LOOKOUT
High Top
Spring
Meadow Creek Mt
Laurel
Run
Big Dro
CREEK
790
92
456
55
312
815
311
2B
Percentage Defoliation
No Defoliation
1 - 50% Defoliation
51 - 100% Defoliation
Proposed 2002 Spray Block
2001 Treatment Blocks
N
0.5
0
0.5 Miles


Monongahela National Forest
2001 Gypsy Moth Egg Mass Survey
Lake Sherwood
Meadow Creek Mt
Robbins Run
LAKE SHERWOOD
Picnic and Campgrounds
Boat Access
(No Ramps)
Boat Ramp
Lake Sherwood
Dilley Run
Clay
672
684
611
374
601
888
815C
886
685
Percentage Defoliation
No Defoliation
1 - 50% Defoliation
51 - 100% Defoliation
Proposed 2002 Spray Block
2001 Treatment Blocks
N
0.5
0
0.5 Miles


Monongahela National Forest
2001 Gypsy Moth Egg Mass Survey
Lee Bell North
92
56
43
Riffle
Creek
McGee
Fork
328
765
Back
1560
Quarry
26
Dry
Run
408
Lee Bell North
Becky
Creek
Big
Lee Bell South
Percentage Defoliation
No Defoliation
1 - 50% Defoliation
51 - 100% Defoliation
Proposed 2002 Spray Block
2001 Treatment Blocks
N

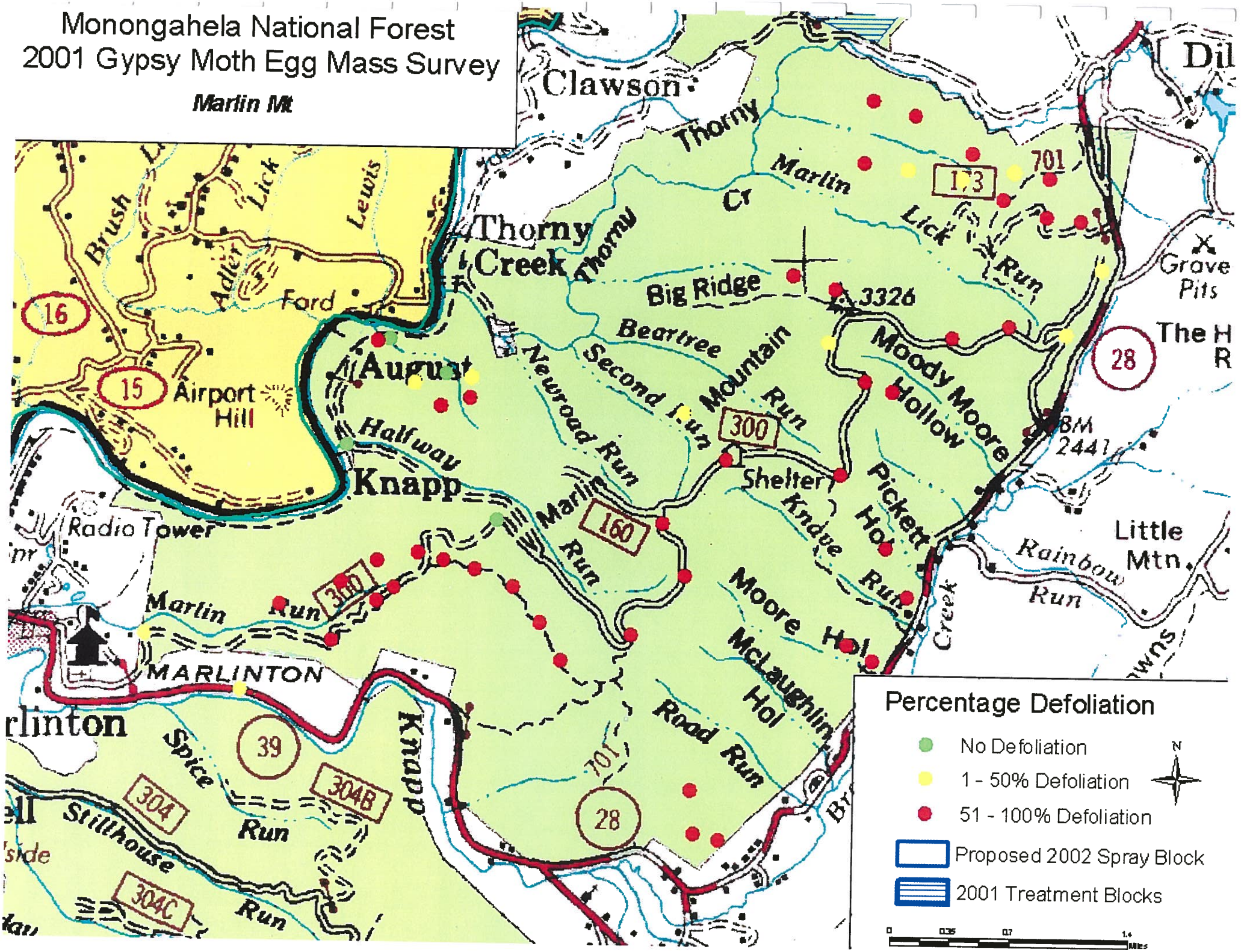

Monongahela National Forest
2001 Gypsy Moth Egg Mass Survey
Lee Bell South
Dry
Run
498
Lee Bell North
Becky
Creek
Big
Lee Bell South
Whetstone
Run
56
43
1566
Percentage Defoliation
No Defoliation
1 - 50% Defoliation
51 - 100% Defoliation
Proposed 2002 Spray Block
2001 Treatment Blocks
N

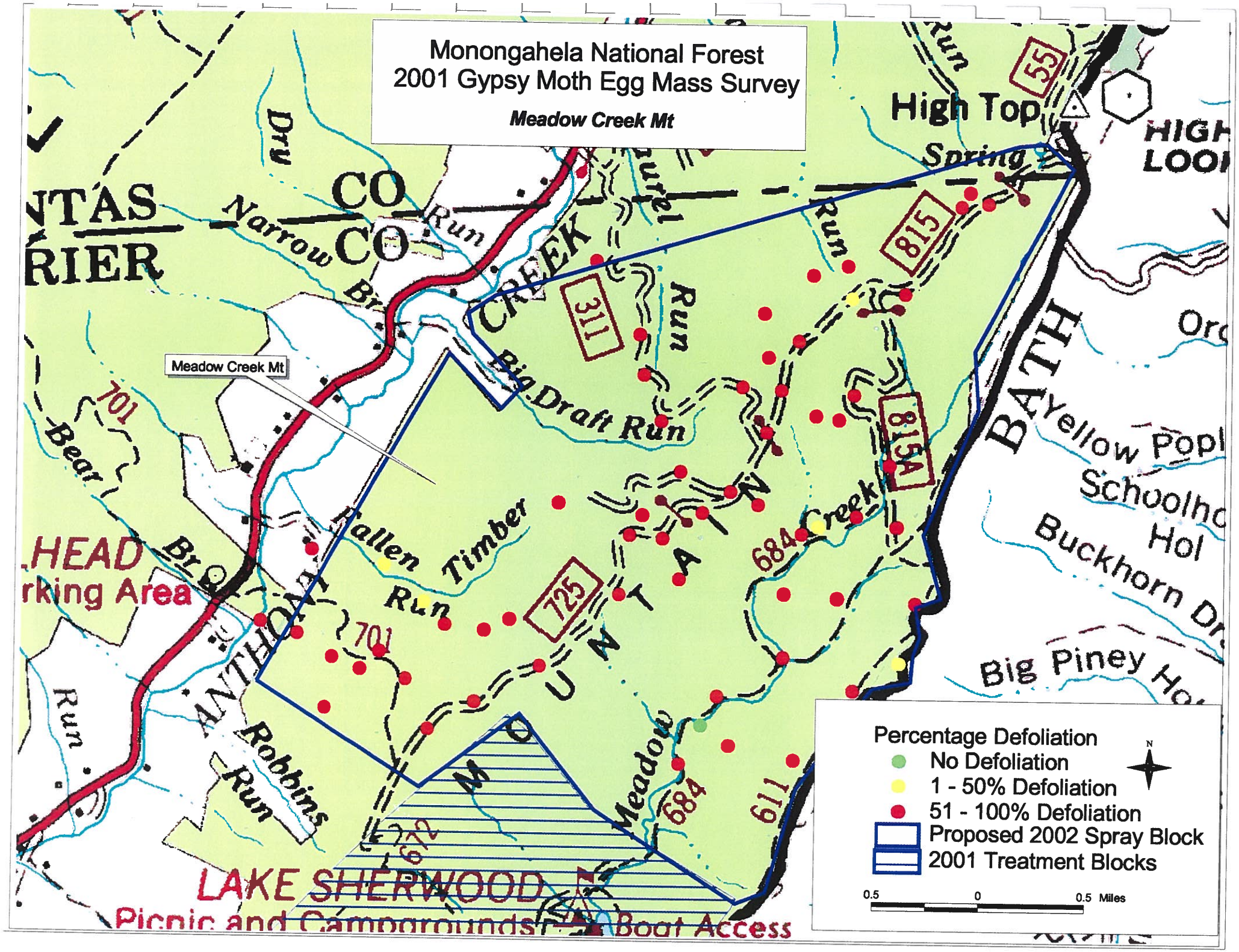

Monongahela National Forest
2001 Gypsy Moth Egg Mass Survey
Lockridge Mt
Brushy Mt North
Brush Mt South
Huntersville
Minnehaha Springs
Rimel
Ryder Gap
Chestnut Levels
Sunrise
TRAILHEAD
Parking and Picnic Area
Percentage Defoliation
No Defoliation
1 - 50% Defoliation
51 - 100% Defoliation
Proposed 2002 Spray Block
2001 Treatment Blocks
0.5 0 0.5 Miles
N

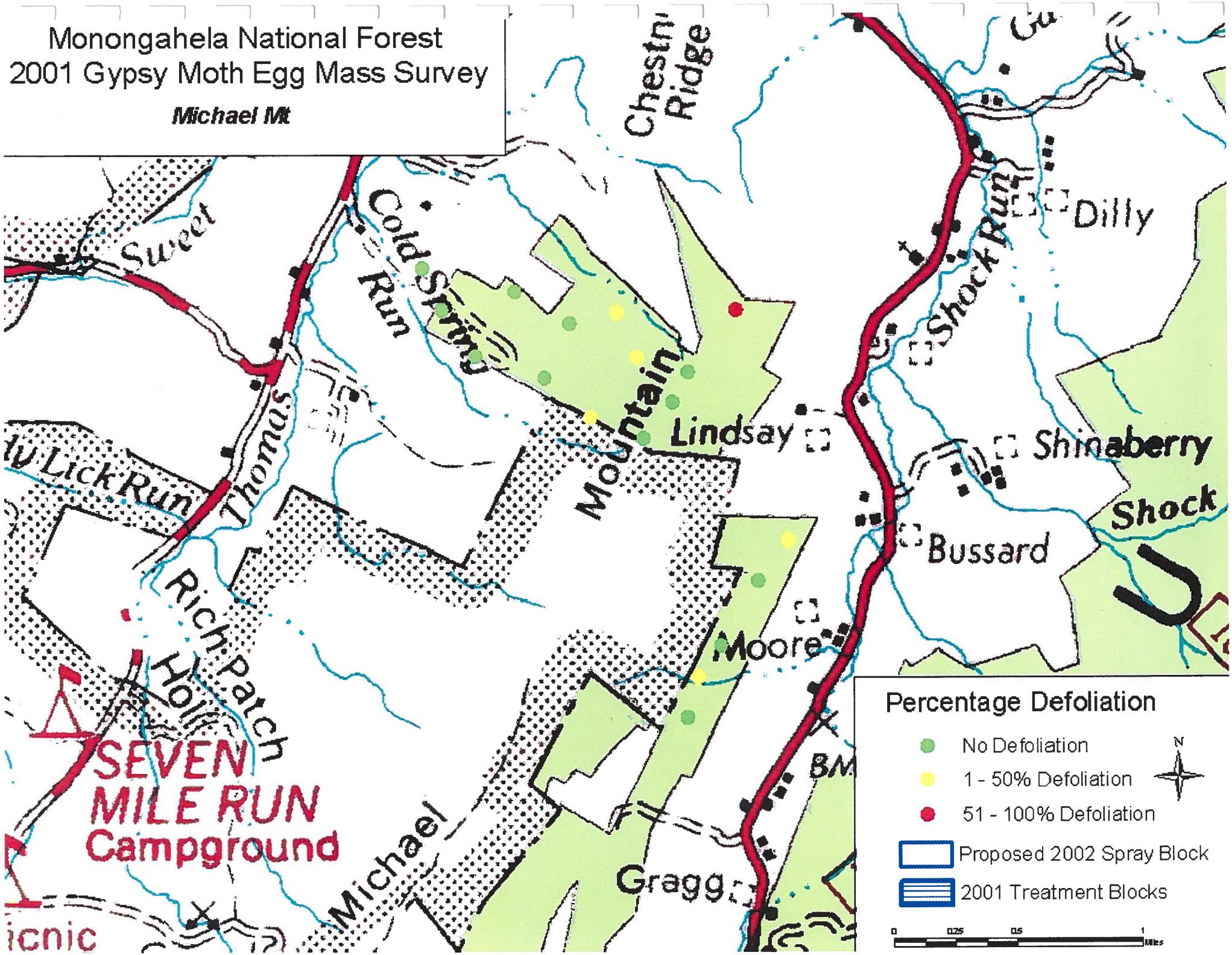

Monongahela National Forest
2001 Gypsy Moth Egg Mass Survey
Mad Tom Knob
Mad Sheep Ridge
Mad Run
Moses Spur
Moore
Sharp
McLaughlin Hollow
BM 3849
Mad Sheep 4225
Mad Tom
Shumate Hol
Newman Hol
Wildcat Hollow
55
2698
925
926
Percentage Defoliation
No Defoliation
1 - 50% Defoliation
51 - 100% Defoliation
Proposed 2002 Spray Block
2001 Treatment Blocks
N

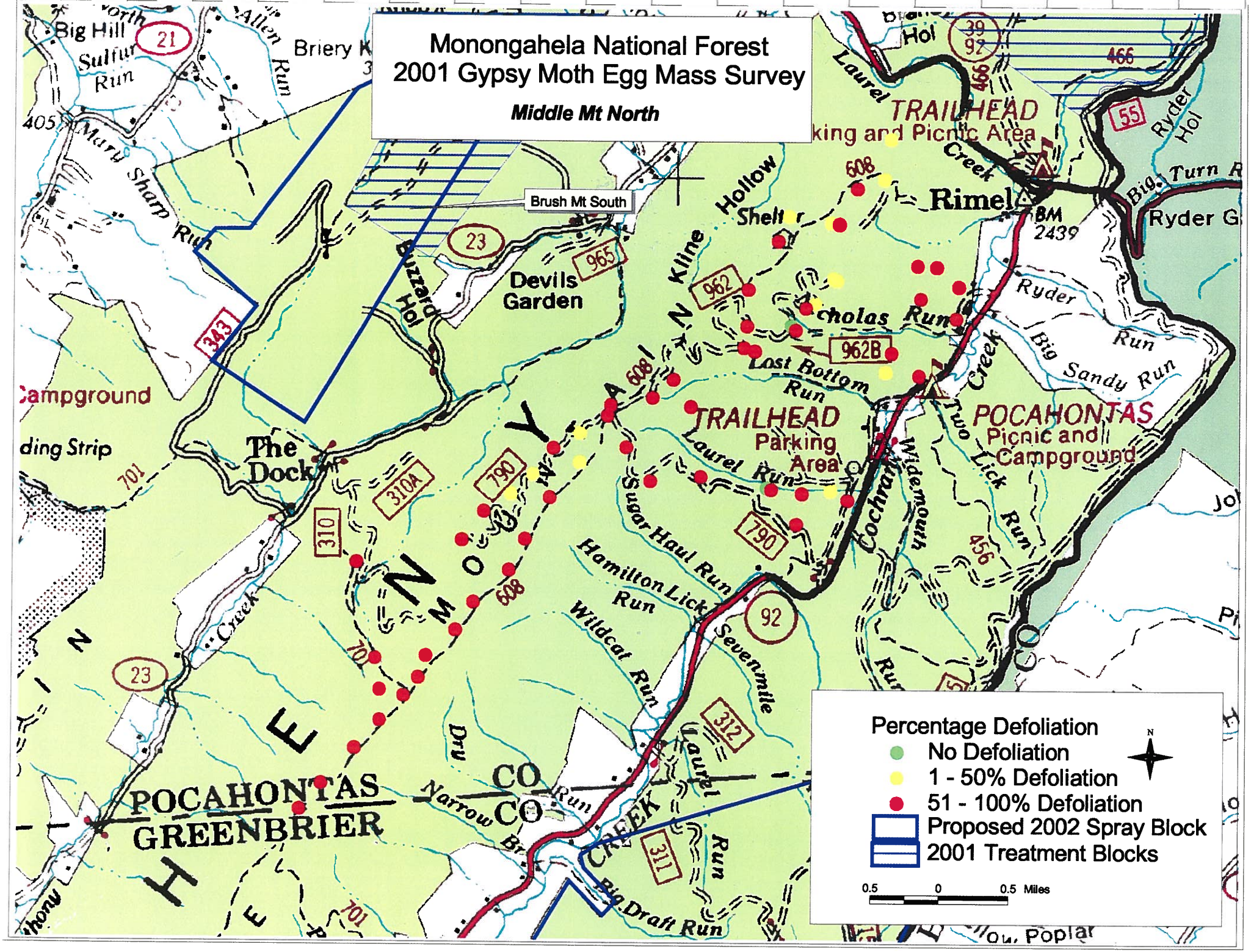
Monongahela National Forest
2001 Gypsy Moth Egg Mass Survey

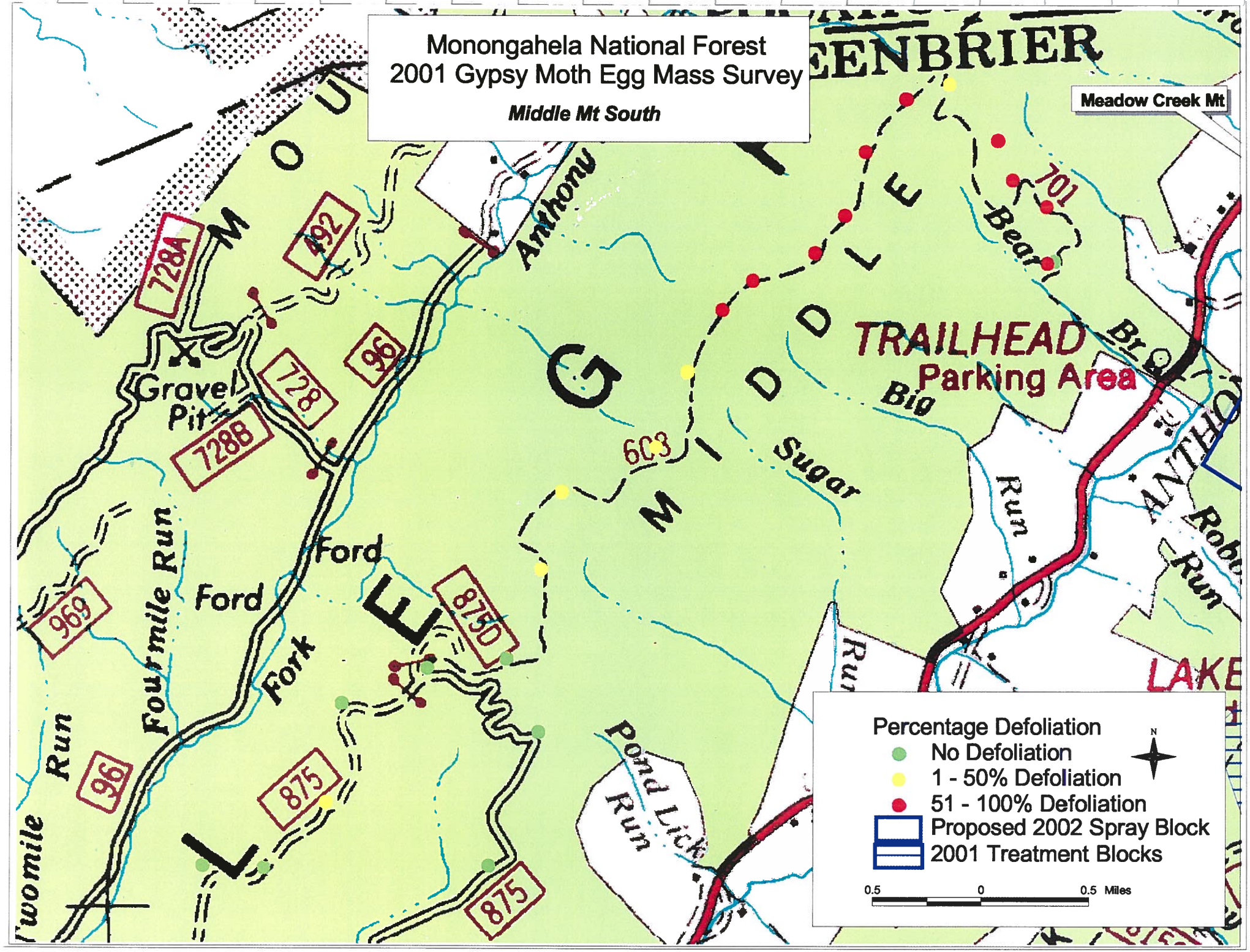
Marlin Mt

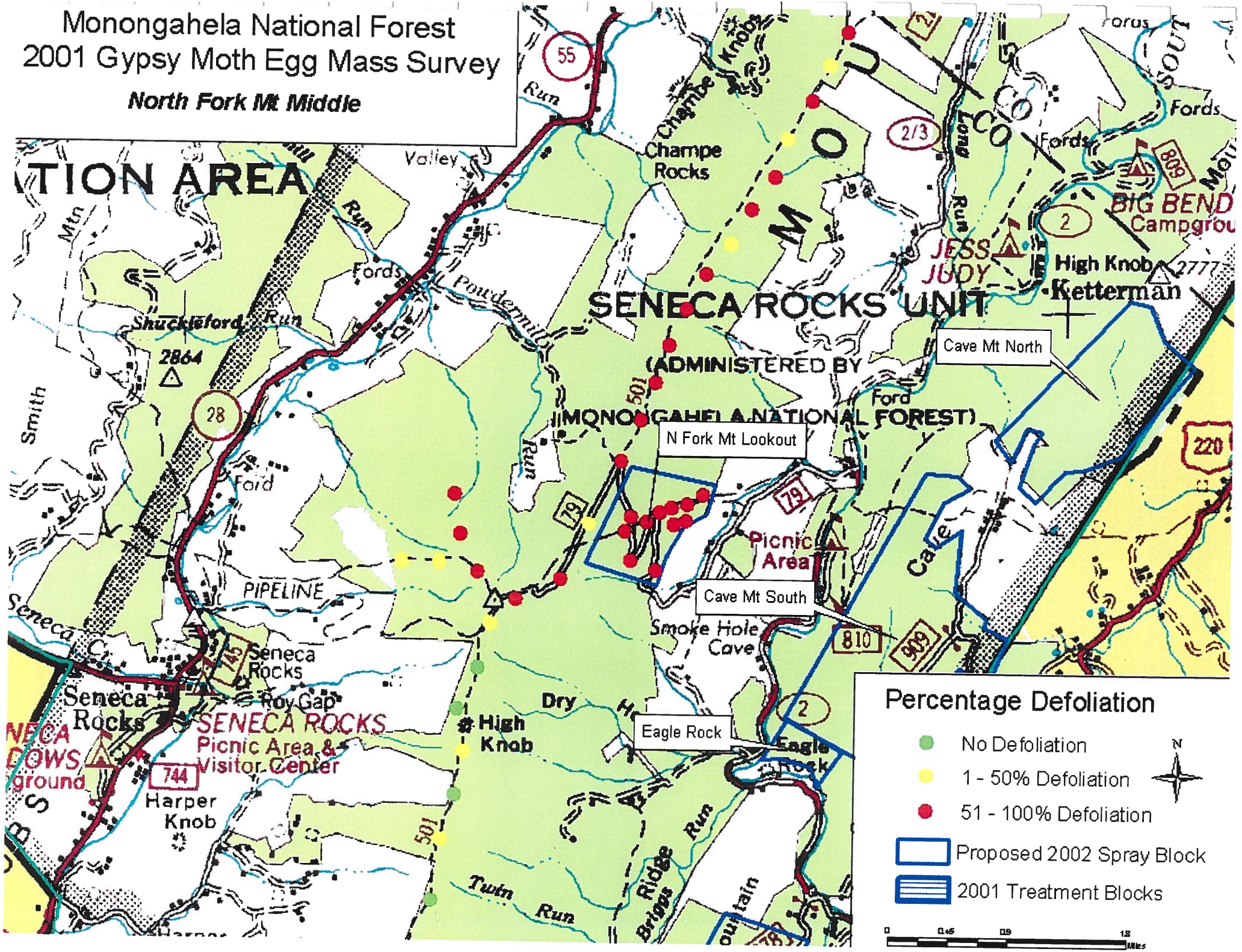


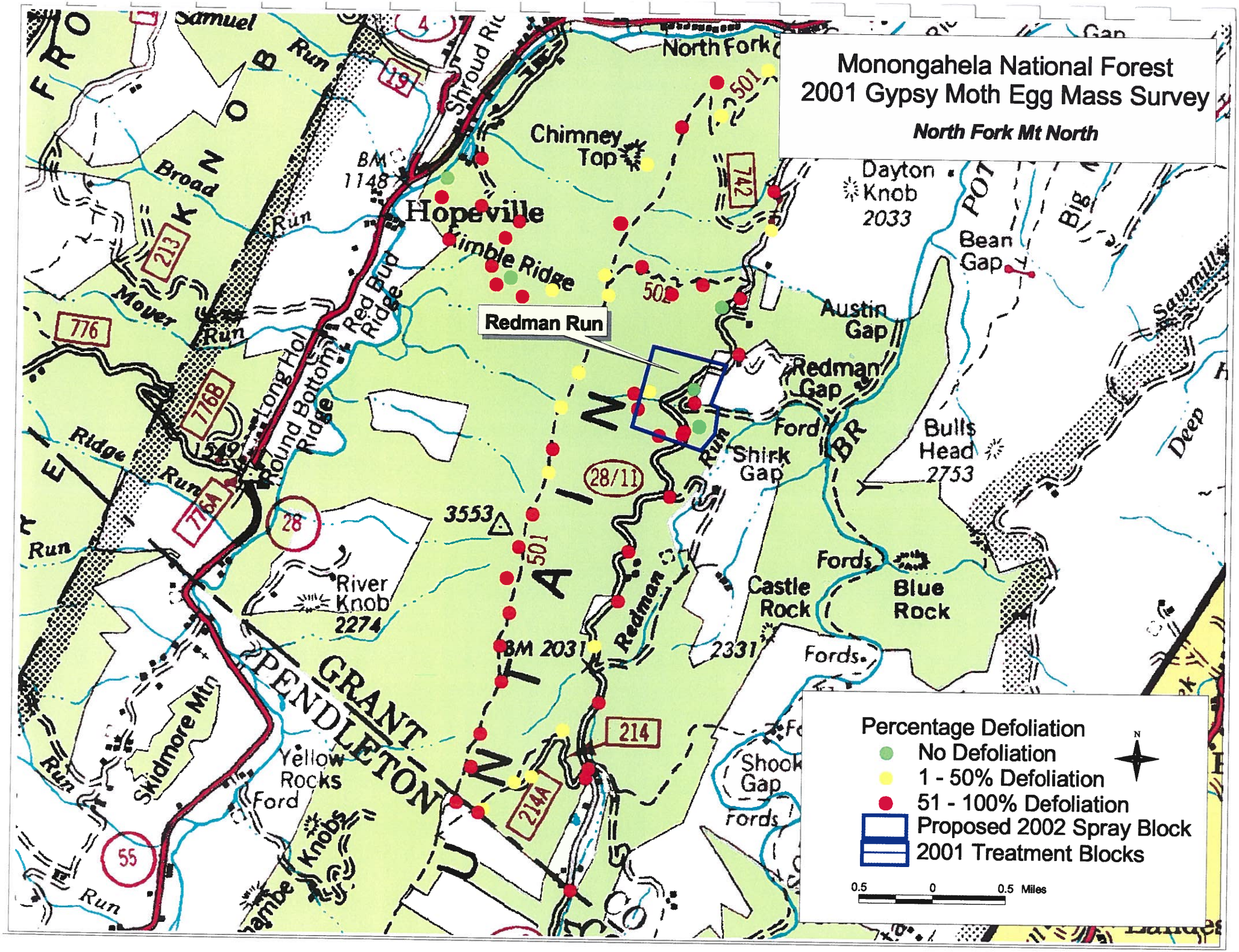

Monongahela National Forest
2001 Gypsy Moth Egg Mass Survey
Meadow Creek Mt
Meadow Creek Mt
High Top
Spring
Narrow
Big Draft Run
Fallen Timber Run
Robbins Run
Meadow
Creek
Yellow Popl
Schoolho
Hol
Buckhorn Dr
Big Piney Ho
BATH
CREEK
Run
Bear
Br
CO
CO
NTAS
RIER
.HEAD
rking Area
LAKE SHERWOOD
Picnic and Campgrounds
Boat Access
55
815
815A
311
701
725
684
611
Percentage Defoliation
No Defoliation
1 - 50% Defoliation
51 - 100% Defoliation
Proposed 2002 Spray Block
2001 Treatment Blocks
N
0.5
0
0.5 Miles


Monongahela National Forest
2001 Gypsy Moth Egg Mass Survey
Michael Mt
Chestnut Ridge
Sweet
Cold Spring Run
Thomas
Mountain
Lindsay
Shock Run
Dilly
Shinaberry
Shock
Bussard
Moore
Rich Patch
Holl
SEVEN MILE RUN Campground
Michael
Gragg
BM
icnic
Percentage Defoliation
No Defoliation
1 - 50% Defoliation
51 - 100% Defoliation
Proposed 2002 Spray Block
2001 Treatment Blocks
N
0
0.25
0.5
1


Monongahela National Forest
2001 Gypsy Moth Egg Mass Survey
Middle Mt North
Brush Mt South
Devils Garden
Rimel
TRAILHEAD
king and Picnic Area
TRAILHEAD
Parking Area
POCAHONTAS
Picnic and Campground
The Dock
Campground
ding Strip
POCAHONTAS
GREENBRIER
Big Hill
Sulfur Run
Mary Sharp Run
Buzzard Hol
Kline Hollow
Shelter
Nicholas Run
Lost Bottom Run
Laurel Run
Sugar Haul Run
Hamilton Lick Run
Wildcat Run
Seven mile
Narrow Br
Big Draft Run
Ryder Run
Big Sandy Run
Two Lick Run
Cochran
Widemouth
Percentage Defoliation
No Defoliation
1 - 50% Defoliation
51 - 100% Defoliation
Proposed 2002 Spray Block
2001 Treatment Blocks
0.5 0 0.5 Miles
N

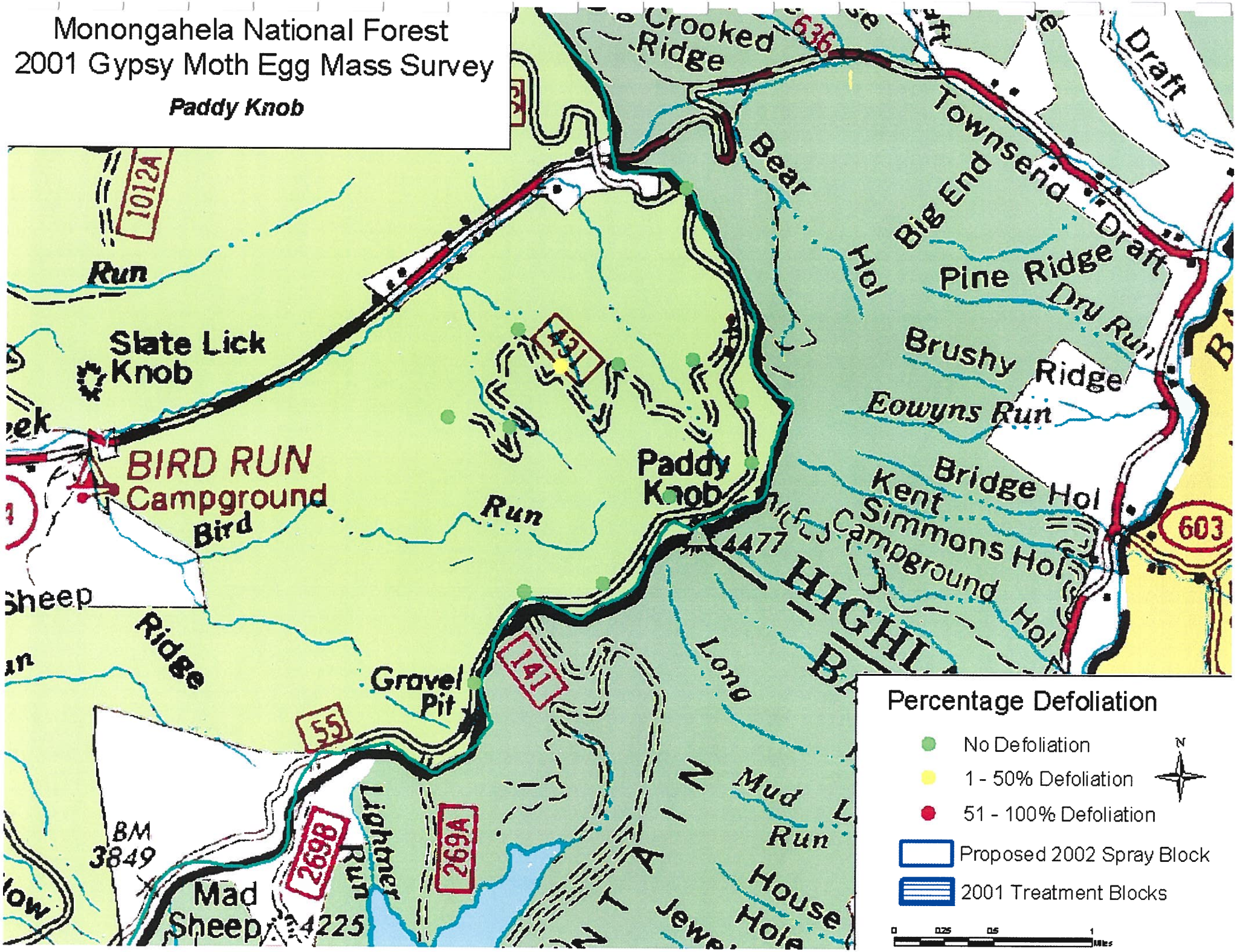

Monongahela National Forest
2001 Gypsy Moth Egg Mass Survey
Middle Mt South
Meadow Creek Mt
TRAILHEAD
Parking Area
Gravel Pit
Ford
Fork
Fourmile Run
Anthony
Bear
Big
Sugar
Run
Pond Lick
728A
492
728
728B
96
603
701
875D
875
969
Percentage Defoliation
No Defoliation
1 - 50% Defoliation
51 - 100% Defoliation
Proposed 2002 Spray Block
2001 Treatment Blocks
0.5 0 0.5 Miles
N

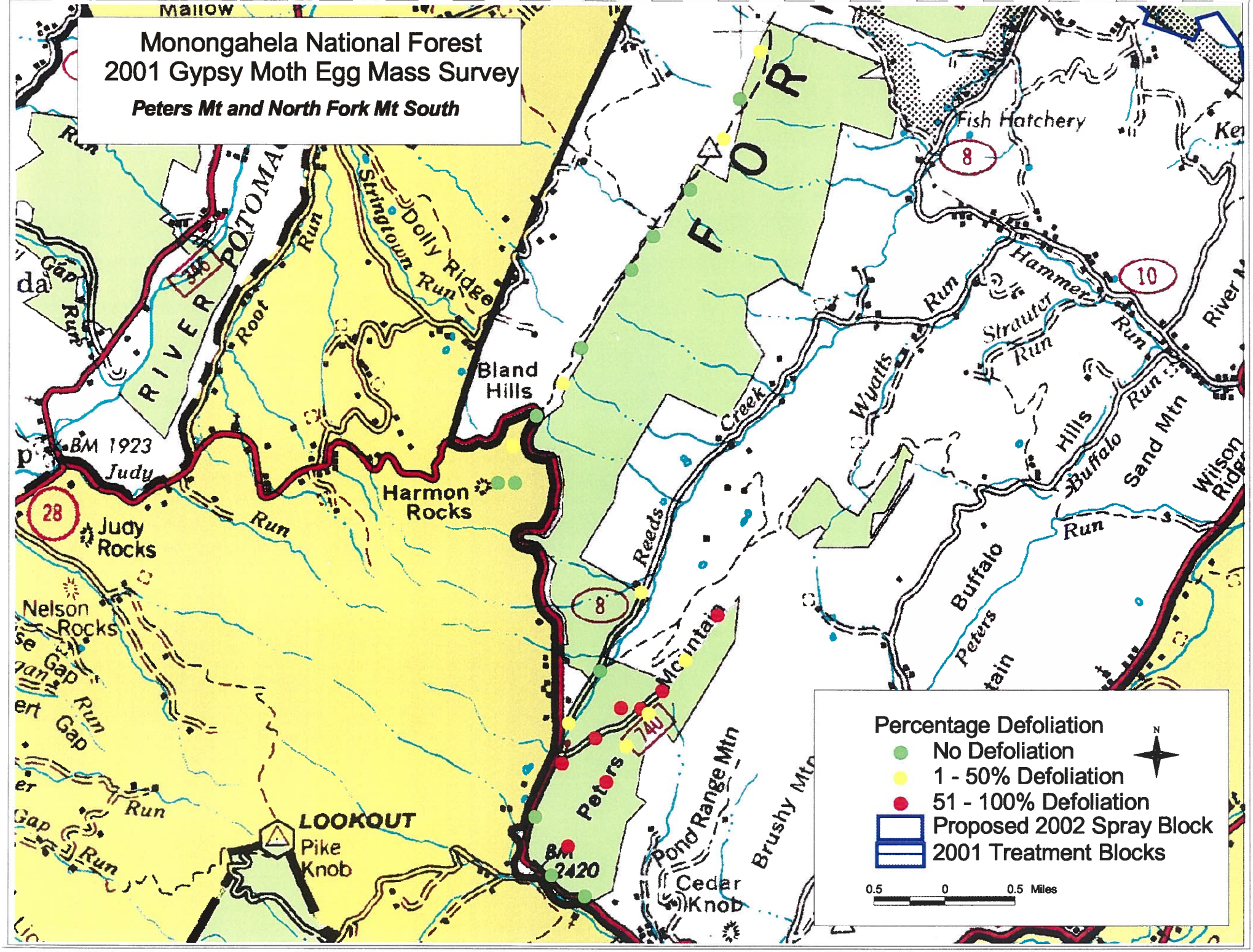

Monongahela National Forest
2001 Gypsy Moth Egg Mass Survey
North Fork Mt Middle
SENECA ROCKS UNIT
(ADMINISTERED BY
MONONGAHELA NATIONAL FOREST)
Champe Rocks
Champe Knob
Cave Mt North
N Fork Mt Lookout
Cave Mt South
Picnic Area
Smoke Hole Cave
Eagle Rock
Seneca Rocks
Roy Gap
SENECA ROCKS
Picnic Area & Visitor Center
High Knob
Harper Knob
Dry Ridge
Twin Run
Shuckleford Run
Poundermill Run
PIPELINE
Seneca Creek
Smith Mtn
Fords
Ford
Valley
JESS JUDY
High Knob
Ketterman
BIG BEND
Campgrou
Percentage Defoliation
No Defoliation
1 - 50% Defoliation
51 - 100% Defoliation
Proposed 2002 Spray Block
2001 Treatment Blocks
N

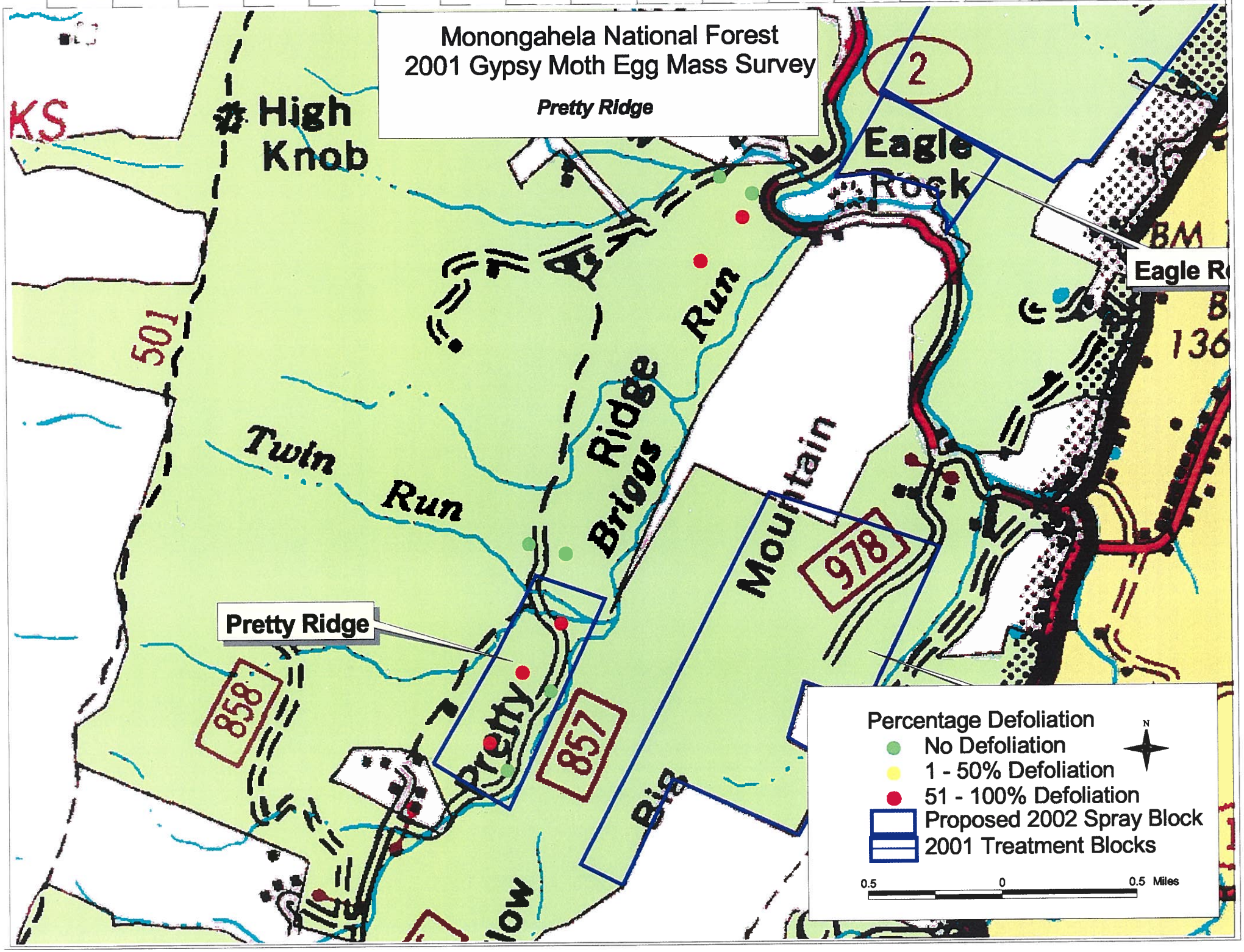

Monongahela National Forest
2001 Gypsy Moth Egg Mass Survey
North Fork Mt North
Redman Run
Percentage Defoliation
No Defoliation
1 - 50% Defoliation
51 - 100% Defoliation
Proposed 2002 Spray Block
2001 Treatment Blocks
0.5 0 0.5 Miles
N
Hopeville
Chimney Top
Dayton Knob 2033
Bean Gap
Austin Gap
Redman Gap
Shirk Gap
Bulls Head 2753
Castle Rock
Blue Rock
River Knob 2274
Yellow Rocks
Skidmore Mtn
Kimble Ridge
Red Bud Ridge
Round Bottom Ridge
Long Hol
Mower Run
Broad Run
Shroud Ri
North Fork
Redman
Fords
Ford
Shook Gap
Sawmill
Deep
Big
POT
BR
GRANT
PENDLETON
MOUNTAIN
3553
BM 1148
BM 2031
2331
501
502
742
776
776B
776A
549
28
28/11
214
214A
55
19
213

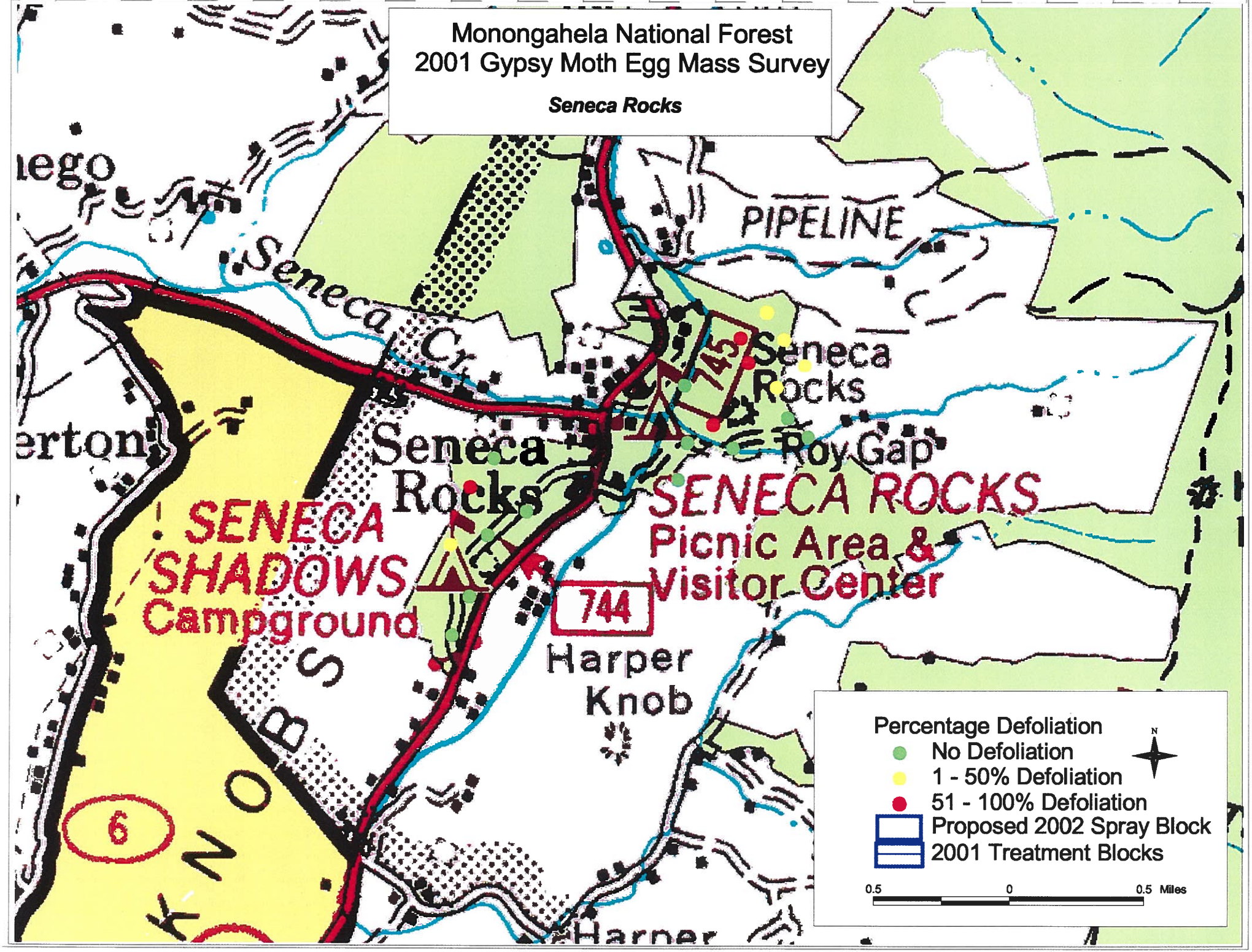
Monongahela National Forest
2001 Gypsy Moth Egg Mass Survey

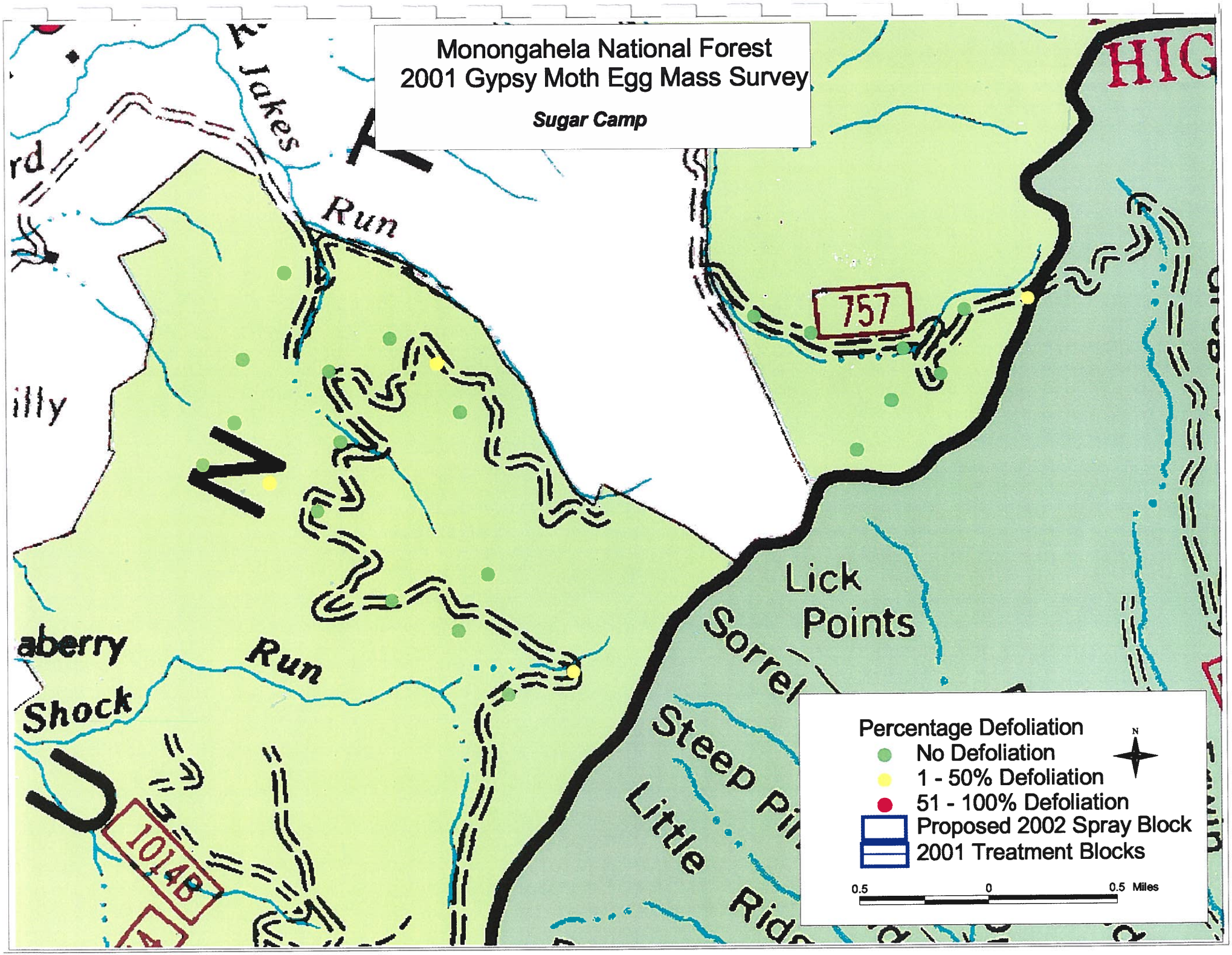
Paddy Knob

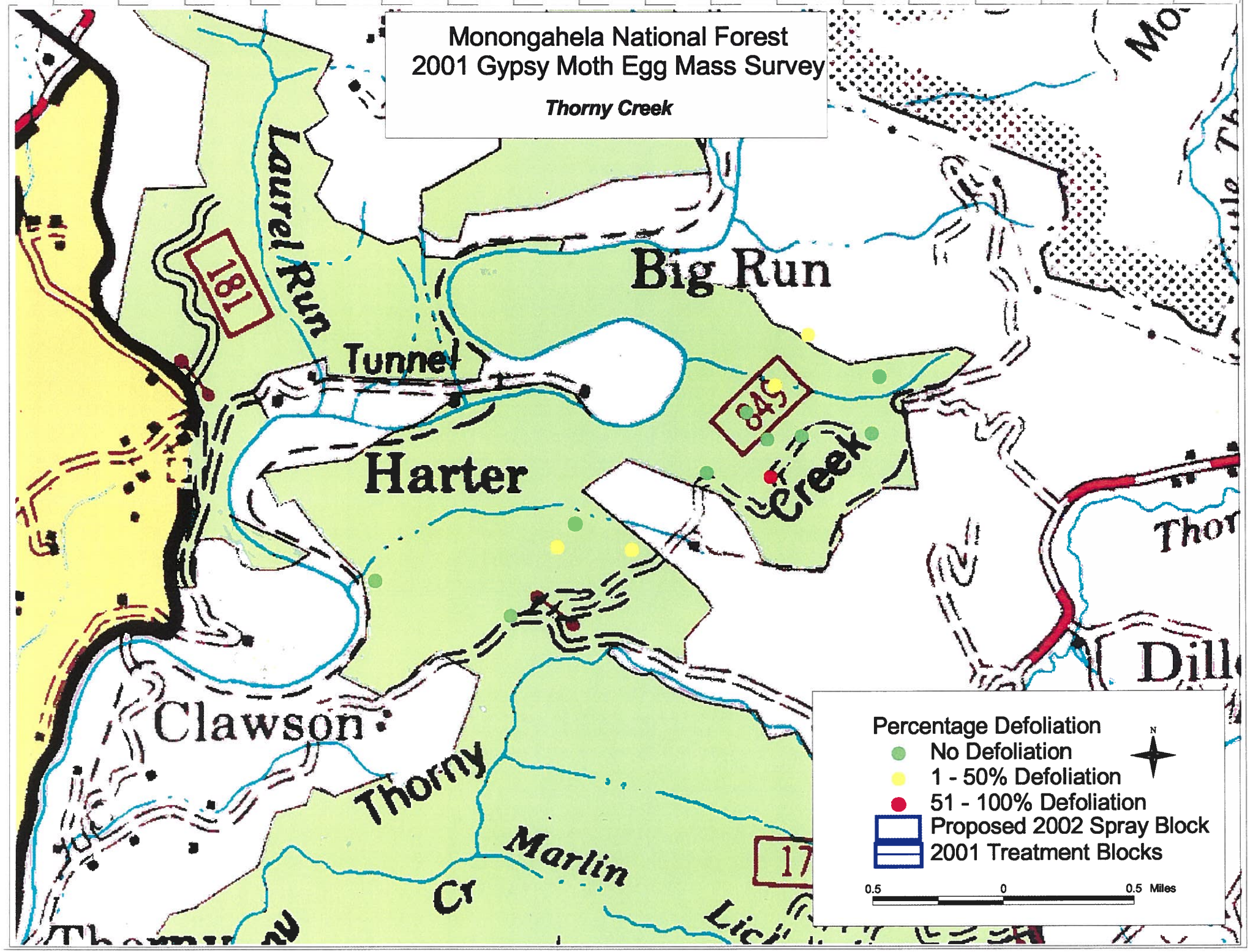


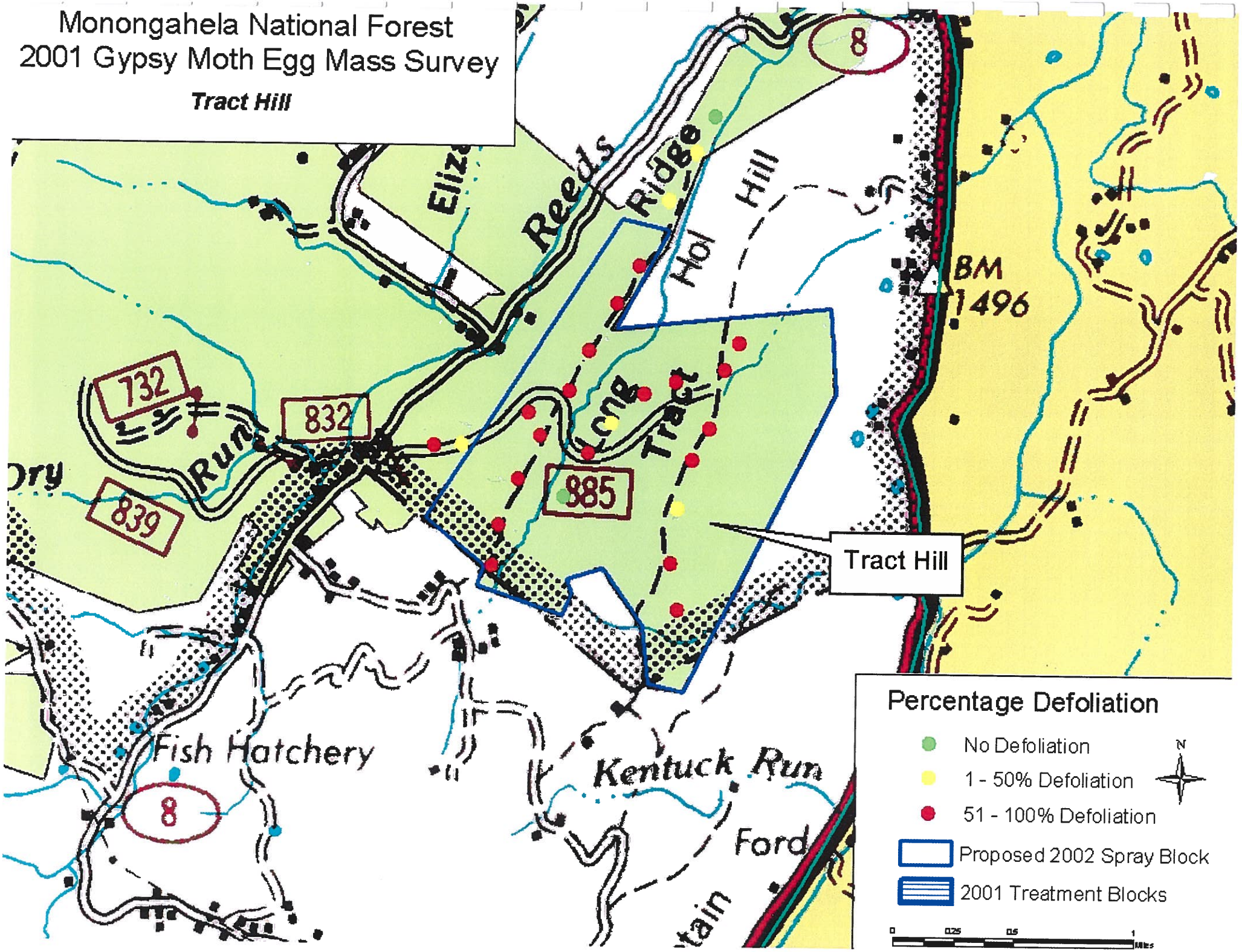

Monongahela National Forest
2001 Gypsy Moth Egg Mass Survey
Peters Mt and North Fork Mt South
Mallow
Fish Hatchery
Stringtown Run
Dolly Ridge
Root Run
RIVER POTOMAC
Bland Hills
Wyatts Run
Hammer Run
Strauter Run
Creek
Reeds
Harmon Rocks
BM 1923
Judy
Judy Rocks
Nelson Rocks
Gap Run
Buffalo Hills
Buffalo Run
Sand Mtn
Peters Mountain
Pond Range Mtn
Brushy Mtn
Cedar Knob
LOOKOUT
Pike Knob
BM 2420
Percentage Defoliation
No Defoliation
1 - 50% Defoliation
51 - 100% Defoliation
Proposed 2002 Spray Block
2001 Treatment Blocks
0.5 0 0.5 Miles
N


Monongahela National Forest
2001 Gypsy Moth Egg Mass Survey
Pretty Ridge
High Knob
Eagle Rock
Eagle R
Twin Run
Briggs Ridge
Run
Mountain
Pretty Ridge
501
858
857
978
2
Pretty
Percentage Defoliation
No Defoliation
1 - 50% Defoliation
51 - 100% Defoliation
Proposed 2002 Spray Block
2001 Treatment Blocks
N
0.5 0 0.5 Miles


Monongahela National Forest
2001 Gypsy Moth Egg Mass Survey
Seneca Rocks
PIPELINE
Seneca Cr.
745
Seneca Rocks
Roy Gap
Seneca Rocks
SENECA ROCKS
Picnic Area &
Visitor Center
SENECA SHADOWS
Campground
744
Harper Knob
6
Percentage Defoliation
No Defoliation
1 - 50% Defoliation
51 - 100% Defoliation
Proposed 2002 Spray Block
2001 Treatment Blocks
N
0.5 0 0.5 Miles


Monongahela National Forest
2001 Gypsy Moth Egg Mass Survey
Sugar Camp
Run
757
Lick
Points
Run
Shock
1014B
Percentage Defoliation
No Defoliation
1 - 50% Defoliation
51 - 100% Defoliation
Proposed 2002 Spray Block
2001 Treatment Blocks
0.5
0
0.5 Miles


Monongahela National Forest
2001 Gypsy Moth Egg Mass Survey
Thorny Creek
Laurel Run
181
Big Run
Tunnel
Harter
845
Creek
Clawson
Thorny
Marlin
Cr
17
Percentage Defoliation
No Defoliation
1 - 50% Defoliation
51 - 100% Defoliation
Proposed 2002 Spray Block
2001 Treatment Blocks
N
0.5
0
0.5 Miles


Monongahela National Forest
2001 Gypsy Moth Egg Mass Survey
Tract Hill
Reeds
Ridge
Hol
Hill
BM
1496
8
732
832
839
885
Run
Tract
Tract Hill
Fish Hatchery
Kentuck Run
Ford
Percentage Defoliation
No Defoliation
1 - 50% Defoliation
51 - 100% Defoliation
Proposed 2002 Spray Block
2001 Treatment Blocks
N